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An Outline of

INDIAN PREHISTORY

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Revised & Expanded
Edition

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Introduction



1. The Background

We inherit a featureless past but our inborn curiosity keeps seeking and constructing shapes from within this darkness. A tribal group, for instance, seeks its origin from a star or a mountain or even an animal in one place, while in another a folk-tale about its origin from the more probable human being may be present. That is, we attempt to explain ourselves or even our surroundings through our knowledge and perception at a given time.

One of the earliest such opinions or explanations is recorded from the second century BC Ssu-

ma Chien, a Chinese court historian, had suggested that man had passed through four different stages of technology: A period of stones, another of jades and then of bronze before he finally entered the period of iron-making and with it the various associated techniques of cultural growth. It is, indeed, surprising to see how close he came to what is indicated from evidences known today. In a slightly later period Greek philosophers came out with similar reasonings regarding the birth of man and the process of his cultural growth. The spread of Christianity in Europe virtually brought about a complete end to these philosophical conjectures and opinions. The *book of genesis* slowly started becoming the main explanation of man and his culture. It was not only considered heretic to entertain any other view of life but there were strong punishments given to such 'pagans' and 'non-believers'. Even leading scientists of the period saw justification in Dr John Lightfoot's conclusion that the earth was created on October 23rd, 4004 BC at the civilized time of 9 a.m. (Dr Lightfoot was from Cambridge University and arrived at this conclusion on the basis of laborious research of genealogical calculations from Biblical sources in 1654.) Geologists were the first to raise their doubts about such a young date ascribed to the origin of the earth. Incidents of accidental finds of inexplicable objects and the courage and conviction of some brave individuals soon started raising heads of doubts about this otherwise comfortable view. One such accident which later on was to lay down the foundation of prehistoric archaeology in Europe was recorded in Suffolk during a church construction. In a letter dated June 22, 1797, John Frere wrote to Rev John Brand, the secretary of an intellectual society in London, his findings of several, "weapons" associated with "extraordinary bones". He even ventured to opine that "these weapons may tempt us to refer them to very remote period, indeed even beyond that of the present world." The **uniformitarianists** school came out with their explanations about the various strata found on the ground as the creations of geological events. Consequently a series of such events were identified and described.

With these the moral bindings of accepting Biblical explanations as the only explanation of our creation was slowly loosened. This helped the free expression of many thinkers. The Lable **prehistory** was first employed by a French scholar named Tournal in 1833. In 1851 Putman used it more specifically to refer to a period beyond history. In 1853 Marcel de Serres suggested the term **Human Palaeontology** which extended human existence beyond the popularly held period. In 1856, in a Dusseldorf quarry, workers discovered the first remains of the **Neanderthal man** which was then explained as belonging to a modern race suffering from some disease (by a brilliant scientist Prof Rudolf Virchow of the University of Berlin). In 1859 came the rude blow to the entire group of conservative scientists. It was the publication of the *Origin of Species* by Charles Darwin. The shock that this most important contribution caused to the intelligentsia is best illustrated by the cartoons and editorials published in numerous copies of **Punch**, **The Hornet** and **Harper's Bazar** in London during 1870-1876.

A French Customs official, Baucher de Perth, posted at Amiens along the river Somme had been making a fabulous collection of prehistoric stone tools from 1838; and by 1841 he had published five volumes to illustrate the point that these were prehistoric tools. Unfortunately he had to face fierce ridicule from the intellectuals until Darwin's brave theory led many to visit Amiens in order to re-examine Perth's huge collection and accept them as prehistoric tools.

In 1865, Lubbock in France divided man's prehistoric past into **Palaeolithic** and **Neolithic** periods. In 1868, the **Cro-Magnon** skeleton was discovered from Les Eyzies and finally in 1891 a Health Officer in the Dutch colonial military forces for south-east Asia, Dr Eugene Dubois, discovered the **Pithecanthropus** in Java. This chain of events which was slowly breaking the Biblical hold on knowledge was successful in giving a scientific footing to our studies before the turn of the century.

Entirely independent from these events, the European colonizers in North America were trying to explain the

mysterious presence of non-whites in this newly discovered land. Initially it was naturally sought to be explained on the basis of the Biblical precepts. William Penn and some other writers explained that the American Indians are the descendants of the "lost tribes of Israel". Closer contact and keen observation, in course of time, gave rise to more logical reasonings about their origin. Some intellectuals amongst them reasoned that man has passed through some evolutionary changes in the past. The American Indians, it was argued, represent one of the earliest such stages of culture which migrated into the new world and remained stagnant as a result of isolation. William Robertson in the book, *History of America*, published in 1777 names One of these evolutionary stages. He was the first to coin the terms **Savagery**, **Barbarism** and **Civilization** to designate the evolutionary stages through which human society has passed. The ideas of Robertson were carried on with more objective description by Lewis Henry Morgan (1818-1881) and EB. Tylor (1832-1917). Morgan, a lawyer, represented the Iroquois in their legal battles against the land-grabbing white settlers. During this process he came close enough to these tribals which enabled him to produce a study of their culture. He published a treatise in 1851 and called this work the 'League of the Iroquois'. Taylor's involvement with culture, on the other hand, occurred mainly because of his contact with the celebrated prehistorian Henry Christy. Intensive work with tribal groups in the later years enabled him to break the subjective connotation of the word culture. In 1871 he published his famous work *Primitive Culture* in which he categorically defined culture as a complex which includes knowledge, belief, art, morals, law and customs in any population irrespective of whether it is from the so called civilized West or from the pagan East or South.

Morgan studied more than one hundred societies during 1857 to 1871. Karl Marx and Friedrich Engels were working on the historic process of socio-cultural evolution in man during the same period and were deeply impressed by Morgan's work. In fact Marx and Engels felt that the conclusions arrived at from the study of the primitive

societies by Morgan were quite congruent with those of their own modern societies.

The ethnographic studies on the one hand and the discovery of fossils and tools of early man on the other, led to the development of a prehistoric archaeology where the assumption had been that the tribals of today represent a culture which must be similar to some prehistoric culture. Naturally the areas of tribal concentration were thought to be unlikely to have a prehistory. Recent discoveries seem to show how biased these assumptions were. A site called Apollo-11 situated in the Huns mountains in south west Africa yielded a total of about seven stone slabs decorated with animal designs. It is believed that these finds could not be more than 6-7 thousand years younger than the earliest west European Upper Palaeolithic art. Similarly evidences of Upper palaeolithic man from Niah cave in Borneo, New Guinea Highlands and now from numerous sites along the coastal Australia can be taken to indicate the generalized presence of early man almost all over the planet, in a period as early as Upper Palaeolithic.

2. Prehistoric Archaeology

The study of antiquities belonging to periods before history is generally considered within the framework of Prehistoric archaeology. It will be apparent from the *background* provided above, that prehistoric archaeology originally developed as a part of culture history, but with more and more involvement of ethnographers from America the subject soon became the common ground for both historians and anthropologists. Besides these two broad subjects, many other natural and biological sciences keep constantly treading on its ground. It may be worthwhile, therefore, to define prehistoric archaeology at the outset. As a discipline it seeks to study the culture and society of man before the dawn of history. The specific questions that the archaeologists study are :

- (i) The sequence of prehistoric occupation in an area
- (ii) The origin and dispersion of a particular prehistoric population

- (iii) The life styles of prehistoric peoples during a given period of time, and finally
- (iv) The laws or axioms which govern the socio-cultural evolution of a prehistoric population.

The last two aspects in the study of prehistoric archaeology are rather recent in their development and were not the prime concern of archaeologists till the first half of this century. It is important at this juncture to note that history as a discipline does not have its own set of theories or law-like generalizations. Consequently, in prehistory till recently the tendency had been to emphasize the classification of archaeological finds and describing them. The introduction of the generalized theory of socio-cultural evolution has led the archaeologists to attempt explanations in order to erect fresh theories. Despite the rather precise set of 4 aims set out for the subject, the actual fields of activities of prehistorians can be extremely divergent. For instance, some study the primary occupation floors of early man in order to discern the stone fabricating activities, their techniques and finished types. There may be others whose concern is the environment and Pleistocene geology. There are some who may be working mainly to understand food production and animal domestication. Many archaeologists interest themselves primarily in the understanding of early settlement patterns developing through urban civilizations, statehood formations or similar issues. Besides these, there may be yet another group of archaeologists who are entirely laboratory bound. They work on such problems as ancient metallurgy, firing of clay and combination of agencies or regents to understand prehistoric techniques of ceramics, alloy formation, inlay work on beads or similar other cultural remains. This diversity of specializations has, by no means, diffused the basic aims of the subject. These specializations combine their respective results into the main enquiries of culture progression through time and space.

3. Culture

The word culture can mean a growth of bacteria, or cells in a test tube, or a specific way of behaving in a specific

situation in a specific society, or even the cause for which parents seek prestigious schooling for their children. In anthropology as well, the meaning of the word has not been entirely unanimous. More than a dozen books are known to be in print, only shredding the word and the concept threadbare. However, a generally accepted meaning of the word may be attempted here. To most anthropologists *Culture is the sum total of the learned behaviour of man which evolves out of the need to adapt within a given environment. Culture is both adaptive and also the means of adaptation.* In short it is the artificially created buffer which envelopes man and through which man interacts with his environment. We inherit our biotic characters from our ancestors through genes while such other things as our language or behavioral 'dos' and 'don'ts' are given to us through the process of socialization. That is, while we inherit the colour of skin or shape of face or similar other features from our parents through genetic transmission; we also inherit language, customs, avoidances and likings from our parents through extra somatic means of transmission. These behavioral aspects that we inherit are grouped together as culture. Many other species of animals learn behaviours from their progenitors but no other animal can employ these behaviours for total adaptation within an environment. For instance bears and rabbits in the arctic have to develop heavy pelts through biological evolution. In man the need for such an evolution does not occur because he can culturally produce fur suit and igloo to protect himself from the environment. If these polar animals were to migrate to the tropics they would die until a series of genetic mutations can make them biologically equipped to cope with the tropical heat. Such mutations are a very slow process and take generations. In other words, the chances of the polar bears adapting and hence surviving in a different climate are extremely low. Unlike these animals the man of the polar region needs to just change his culturally acquired kit to adapt to a different climate. Although such a change will call for a series of adjustments in his other cultural components, yet his possibility of survival will be cent percent more than that of the animals. In other words we can lay down another

law for culture. **Culture is uniquely human.** In the above example we have been talking of certain material objects as culture because these are devised by man as an extra-somatic means of adaptation. Culture is not merely these material objects shaped by man, but also a complex set of behaviours and behavioural sanctions which maintain, regulate and perpetuate the creation of such material objects. This array of habits, both material and non-material, are integrated within the social fabric of the community. This interrelated nature of culture is designated by the expression (that) '**Culture is patterned**'. A society is a group of interacting individuals. The interaction is based on the structure of the social organization. Culture is the "fixed deposit" within the society. That is, the society acts as the vehicle of culture, while the dominant social behavior of its members is determined by its culture. Like "fixed deposit" culture also accumulates changes and these changes, again, being related to the society bring about adjustment within the society. The progression or continuation of culture through time, therefore, requires the understanding of the mechanisms of culture change. The mechanism of culture progression is often referred to as **Culture process**.

Most of culture and its patterned structure is not retrievable for an archaeologist. It is only through the undestroyed remains of the past that actual culture is reconstructed. No one has ever heard about the digging out of a political system or a set of religious beliefs, yet reasonably clear and convincing political system of the early urban societies of the Middle-East or the religious structure of the Aztecs of Central Mexico have been archaeologically reconstructed. What the archaeologists recover are material objects which were created in the interaction of these behavioral systems. Tools, pots or fire hearths are all products of a culture and are hence linked in a systematic manner. Careful recording of all these along with their context and spatial spread is analysed in deductive logic in order to obtain information regarding the culture. The general laws which guide these deductions are obtained from unknown and surviving cultures. Here

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we may cite a few such laws to enable our understanding of the logic of archaeology. For instance, if, in a society, all pottery pieces are identical in most of the attributes then such a society is taken to have a very centralized group of professionals producing the needs of the society. In addition, this can also be taken as an indication of an efficient distribution system. On the other hand, when a society has a large degree of individual variation in ceramics it can have only a nominal leadership the jurisdiction of which may at the most be applicable to settling disputes or organizing in case of defence or similar other ad hoc needs. Many such general laws are kept to guide the mute data of the archaeologist.

4. Concept of Culture

When Morgan was working on primitive contemporaries to establish his theory of unilinear socio-cultural evolution, some archaeologists like Heinrich Schliemann (1870), Grafton Elliot Smith (1911) and others were arguing that diffusion was the main cause of the spread of civilization. Such archaeological explanations did not make any dent in the popular anthropological theory for cultural evolution. In fact Morgan went at great length to qualify these stages in cultural evolution. For instance, the initial period of cultural evolution, called the lower stage of **Savagery**, was characterized by men living on fruits and nuts and without the knowledge of fire. This was followed by the next stage of **savagery** when men lived on fish and used fire. This scheme continued in seven such stages - the last one corresponding to the 19th century Europe. Soon it was felt that although Morgan had amassed enormous data on tribes, his evolutionary scheme was not adequately supported by empirical data. Further, it could not explain several cases of apparent de-evolution in the ethnographic records.

The chief opponent of Morgan's scheme was Franz Boas, who taught at Columbia University from 1896-1941. Boas emphasized the collection of historical data for every cultural element before one can put forward any law regarding culture change. In the urgency of gathering cultural history of tribals Boas had to push back the main

cause of the data collection viz, evolving laws of culture changes. The Boasian emphasis on history of culture has led to designating his approach as **Historical particularism** by subsequent workers. This approach views culture as a conglomerate of traits coalesced and held by a population. This can result from either the groups own peculiar history or through contact. A major contribution of this period to archaeology was the increasing interest being paid to chronology so that variation in cultural remains could be arranged in correct sequence. The other major change in archaeology during the period is the increasing attention being paid to the artifacts themselves. That is, a complete description of the recovered artifacts was followed by grouping these into certain categories and then tracing their origin, expansion or disappearance. Very soon it was realized that these archaeological studies have really little to do with the study of man. In 1948, Walter W Taylor, in his dissertation titled "*A Study of Archaeology*" successfully demonstrated how Boas's historical particularism when applied to archaeology ceases to be of any relevance to culture. The alternative suggested by Taylor can be recalled later on. Here it will be relevant to mention, very briefly, some of the important approaches to culture suggested during and after the time of Boas.

(i) **Emile Durkheim** (1858-1917) professionalized sociology in France and established the fundamental premises of the study of social functions which abundantly contributed to the functional approach in anthropology and sociology. Durkheim defined the function of a part as the contribution it makes for the satisfaction of a need of a society. Even society has a charter of needs. Various parts of society function in interdependence to fulfil the needs which are indispensable and necessary. Once the needs are fulfilled the society continues and perpetuates itself as an ordered arrangement of parts. Durkheim did not call this methodology either structural functional or functionalism. For him, the main goal of sociology was to advance a sociological explanation, stating what are the social causes of a particular phenomenon and what contribution this sociological explanation makes to society. The propositions

of Durkheim's study of social function were developed further by a British social anthropologist, A. R. Radcliffe Brown. The latter accepted Durkheim's perspective but did not agree with the usage of the word *need* because it was a biological and technological connotation. The word was substituted by a phrase "necessary conditions of existence". Durkheim's cogent writings centered around division of labour, the explanation of suicide rate and totalitarianism. Consequently these works did not influence many archaeological analyses. However, some works appeared during the first two decades of the present century which endeavoured to combine the functional model with a diffusionist one. The early writings of V. Gordon Childe fall into this category.

(ii) **Heinrich Schliemann (1860) and Grafton Elliot Smith (1911)** Heinrich Schliemann demonstrated through his study of Troy and Mycenae that every society did not evolve into higher forms of achievements as is anticipated in the evolutionary theories of Lewis Morgan and Karl Marx. Many regional cultures with distinct technological status and forms of social organization could grow both in time and space. This analysis proved to be congenial for the emergence of diffusionism. Elliot Smith, earlier a professor of anatomy in Government Medical School, Cairo, in 1900 was profoundly impressed by the prehistoric ruins of Egypt. He spent a decade making a detailed study of these remains and published *The Ancient Egyptians* (1911). In his diffusionist approach, he traced the origin of every cultural item of ancient civilizations to prehistoric Egypt. Cultural diffusion, which got an impetus from Smith, was followed in many archaeological and anthropological studies in later years. W. J. Perry was one of the closest disciples of Smith. A strong foundation of diffusionist approach was also a vehement criticism of evolutionism.

(iii) **V. Gordon Childe (1892-1957)** came to Oxford from Australia to study comparative philology, but was so deeply impressed by Sir Arthur Evans's discoveries of the Minoan civilization that he began to study prehistory leaving linguistics altogether. He started identifying, classifying and chronologically ordering all the available cultural

evidence in British Museum. These data were conveniently synthesized by him in *The Dawn of European Civilization* (1928). Childe adhered to the diffusionist approach but was considerably influenced by the Marxian writings. European prehistory all date to a large extent, follows the generalized pattern of analysis used and popularized by Childe. There is no denial of the fact that cultures evolve and diffuse, but an overemphasis on any one of these would drive one into the dungeon of reductionism. Childe's work was an evidence in the moderation of these approaches. As a matter of fact Childe's main contribution lies in defining cultures by their surviving and unperishable traits, viz, stone implements, ceramics or house forms. That is, how certain varieties of cultural attributes, when always occurring together, can be taken to reflect the 'modes of survival' of a population and how these traits can be isolated to observe their distribution at time and space. He used 'evolution' and 'diffusion' in controlled and limited way for explaining the observed changes.

Gordon Childe's analysis is often called the technological theory of social change, which stated that change in technology would induce a change in other aspects of social life. According to him the world has so far witnessed three revolutions, viz, Neolithic revolution, Urban revolution and Industrial revolution. A change in the level of technology needed for food production in different historical epochs was responsible for changing the style of life, the nature of relations, the world view and the ethics of people.

(iv) **Leslie A White** (1948), an American anthropologist, influenced many of his students who in later years were to pioneer the studies of change in prehistoric archaeology. He espoused the 'energy model' according to which every culture makes use of the amount and sources of energy available to it. The technological advancement of a culture and the total complexity of it is examined in terms of the energy harnessed per capita per individual in it. The primitive cultures and the process of evolution thereof was demonstrated in terms of this argument and the unilinear evolutionary model of Morgan and others was resurrected.

by him. Depth of demonstrative arguments and the analysis of the functioning and evolution of complex social systems in White's approach was readily acceptable to many archaeologists.

(v) **Julian H Steward** (1930), an anthropologist from Jinets, attributed ecology its optimum role in determining culture. Not that earlier scholars were unaware of the importance of ecology but he took lead in demonstrating the relation of certain aspects of culture with differing ecological constraints. In 1937 he studied the western Pueblo Indian and published the *Ecological aspects of south western society*. In 1945 he brought out his magnum opus, *Theory of Culture Change* wherein he developed a methodology for "determining regularities of form, function and process which recur cross culturally among societies found in different cultural areas." Contrary to the unilinear evolution he prescribed a multilinear evolution of all cultures. Lewis Morgan and Leslie White had conceived of culture as a layered cake technology being at the bottom, social organization in the middle and ideology forming the top layer. Steward added environment to this cake and demonstrated how these three aspects of culture alter to accommodate slight environmental changes.

(vi) **Bronislaw Malinowski** (1944): The wave of Boasian anthropology, which saw its glory in United States, was opposed by a British Cultural Anthropologist, Malinowski. He conceived of culture as an integrated whole. It consists of parts which collectively satisfy the biological needs and other wants of an individual. Once the biological needs are fulfilled, new imperatives are created which, like the former, require satisfaction. Since the mechanism of satisfying these needs alludes to their function the perspective is called **functionalism**. Radcliffe-Brown later on demonstrated that functions also operate within a structured system and hence viewing culture within what he called, a **Structure-function** frame will be more appropriate. This approach since then, has been extremely popular in British Anthropology.

(vii) **Lewis R Binford** (1965) was a student of Leslie White at Michigan University in 1960. This was a very fateful

time for archaeology. Culture was generally conceived as a system of inter-related parts. Mathematics provided the systemic analytical approach which fitted perfectly with the functional model of Malinowski. In 1965 Binford's famous article "archaeological systematics and the study of cultural process" was published in *American Antiquity*. Binford proposed that archaeologist's data (artifact) can be divided under three sub-systems, viz **Technofacts**, **sociofacts** and **ideofacts**. The object used to combat directly with the physical environment are *technofacts*, those used for social function are **sociofacts** and the objects contributing to the ideological aspects are *ideofacts*. The interplay of these sub-systems becomes progressively complex with an increase of population and other activities in a system. Of these cultural sub-systems, one most directly concerned with exploitation of environment is technology. Hence it was assumed that technology determines the efficiency of a culture to a large extent. Social organization and ideological set up adjust themselves to the technological levels or strategies chosen in the community. It is held that any given technology has a corresponding social and ideological level. Briefly, this is the stand of the proponents of **Cultural Materialism**. It is clear that this view is not a novelty but had broadly been the basis of Karl Marx's analysis of cultural development. Gordon Childe had also elaborated the role of technology within a culture.

Culture Ecology is yet another approach to culture which emphasizes ecology as the overall regulator of the three sub-systems. The main argument of cultural ecologists is that no technological system exists in vacuum, but is rather an answer to the constraints of physical and social environments. Therefore, any change in these conditions is likely to be reflected in a corresponding adjustment in technology and eventually in the remainder of the sub-systems. Julian Steward, mentioned earlier, is usually linked with the working out of cultural ecology of primitive societies, though his basic hypothesis had been that of multilinear evolution of all cultures.

5. New Archaeology :

Many students of archaeology consider the New Archaeology to be a discipline loaded with sophisticated statistics and therefore tend to avoid or even at times criticize it. In an oversimplified manner if we reduce everything done by a conservative archaeologist as mere techniques and combine these with anthropological enquiries we get New Archaeology. If link the word **processual archaeology** used by some should be more appropriate because what was new in 1960-1970 has no justification of being still called new in 1994. The term processual is used to indicate that it is the cultural process which is the main enquiry in this approach. The best term, of course, should be **Paleoanthropology**.

The maturing of processual archaeology within the last decade is mainly due to four significant publications appearing between 1960-1967. Albert C Spaulding in 1960 published a paper titled "Statistical description and comparison of artifact assemblage" which opened the way of quantification in archaeology. Binford attempted his systemic model in 1965. Carl Hempel in 1966 published his book titled "*Philosophy of Natural Sciences*" which deals with the epistemological issues. The nature of general law and its relation with statements of explorations etc seem to have profoundly helped in developing scientific level of explanation in archaeology. Finally James Deetz in 1967 published his work on *Human behavior and archaeological remains*. This work was to lay down the basic rules for deciding various attributes or attribute clusters in order to identify cultural behaviors. These works (added with Binford's strong personality) brought about a revolution in archaeology. In numerous papers, lectures and seminars Binford started advocating more rigorous scientific testing and developing research strategies based on hypotheses derived from general laws. In 1968 the Hindsda (Sally & Lewis) published *New Perspectives in Archaeology* and demonstrated how greater rigour in data analysis in the new system brings forth much more relevant information than the earlier works. Soon William Langacre, Albert Spaulding, Stuart Struever, Paul S Martin James Hill and

many others realized how 'archaeologists, too were confronted with the bewildering and perplexing fact of disparity between what (they) wanted to accomplish - an explanation of why cultures change and what (they) were actually doing histories of sites' (Martin, 1971, p 1-8)

As a final note it should be mentioned that there is already a split appearing from within the proponents of processual archaeology. One of the groups feels that formulation and testing of general laws of cultural behaviour is their prime objective. They use statistical correlations and other sophisticated quantitative factors in Hempelian sense. Another group of them feels that these laws can not adequately explain living processes. To them system approach with feed back principles is a more adequate tool to deal with prehistory.

The difference in approach notwithstanding, Archaeology is certainly making progress towards laying scientific foundations for itself.

6. Social Evolution :

Does this mean that we have lost sight of the 'wood' in order to concentrate on a 'tree'? No, the broad views of the evolution of a society as laid down by Leslie White in the beginning and then re-discussed by Elman Service (1971) and Marshall Sahlins (1972) are still widely accepted. Ethnographic records of contemporary simple societies indicate that :

Bands are the most primitive form of human organizations. This is usually a loosely bound group of 25 to 60 people who are related by kinship ties. The group co-operates in hunting and gathering activities without any form of permanent leadership. Many a hunting and gathering population in the world are even today found to live in Band Societies. It is quite likely that man, from his early Palaeolithic emergence till the beginning of agriculture, may have lived in this form of society. Abundance or scarcity of resources as also the population density within an area, can often bring about drastic changes in the band formation. Smaller sub-bands spread over a larger area or many independent bands may shrink into a single band.

chief was guarded by spiritual ascriptions. In a state-organized society the ruling class is secular (although it can seek religious sanctions) and hence needs to be maintained by a full fledged managerial system: military system, justice system or even slave system. The first Mesopotamian city states were headed by religious leaders and perhaps many of the other city states also started with a strong spiritual sanction.

7. Archaeologists' way to culture

The evidences recovered by an archaeologist for most parts seem as remote from culture as a pencil is from education. Nobody can, however, deny that the presence of one can be taken as the reflection of the other. In the same way no matter how far-fetched the retrieved object might look from human culture, it cannot be denied that the object is a product of human activity. If the object repeats itself through time we can safely conclude that this is the product of a patterned behavior which has been passed on through subsequent generations. Consequently such objects are conventionally accepted as cultural traits in archaeology. This argument will become more convincing when we consider that man satisfies his needs by shaping his environment. These environmental objects shaped by him are cultural and become, at once, a simultaneous indicator of three very important features of the past.

- (i) The cultural objects decide the kind of need man wanted to approach with them. Most of our needs being the result of our biological requirements interacting with the environment, an indirect indication of the environmental stress can be deducted from these objects.
- (ii) The cultural objects reflect the technological status of the community.
- (iii) Finally these are also indicative of the degree to which the environmental constraint was meant to be overcome by the society.

Besides being the vehicle of these important informations of the past, these cultural objects are also cultural traits.

That is, they represent only a particular way of satisfying a specific need which obviously is being alternately manifested. These artificially prepared representative objects (called artifacts), when seen in identical form in repeated numbers, can be taken as reflecting the products of human culture. Artifacts reflect human culture. It has different levels and represents the way of two different forms to represent the products of these four varieties of behaviour. Here, the basic trait of an object has to be first identified. Let us call it the **attribute**. Attributes can be combined by an individual to form a **artifact**. Naturally any patterning observed in attribute level is a result of behaviour at individual level. When a group of individuals within a community combines several artifacts this group may be identified as the **subassemblage**. A sub-assemblage reflects the behaviour pattern of a group. Several sub-assemblages combine to form an **assemblage** which can be taken to reflect a community behaviour pattern. Finally when several assemblages are combined for the entire society this large group may be called the **archaeological culture**. The specific qualification of a culture synthesized through archaeological methods is different from an ethnographer's culture. This is mainly because an archaeological culture is entirely devoid of informations regarding social organization which perpetuates the culture or the ideological sanctions which control its alternatives. Serious misconceptions and wrong interpretations can result when these archaeological cultures are treated as similar to ethnographic cultures. It is true that the archaeological cultures do behave in many respects, as ethnographic cultures but this note of caution becomes doubly important especially for this reason.

In prehistory the ethnographic connotation of culture is aimed but the way to it is controlled by carefully defined attributes which form the basic units of the study. The antiquities retrieved through excavations are technologically and morphologically described and a language of Types is evolved in the same manner as the essential ten numbers of mathematics. That is, these types are attributes like 1, 2, 3, ..., 9 and 0 for prehistory. Each one of these digits is precisely defined, yet in

combinations are meant to convey a meaning which has nothing to do with their individual characters. Further, they can produce infinite number of combinations. All these combinations will have the common feature of having no more than the above ten digits. Defining of types has not always been an easy job for many prehistoric periods and ascribed probable functions of the objects have often tended to confuse the issue further. It is not unusual, therefore, to find scientists engaged in disputes over types for many periods and regions in prehistory. The term **tradition** has also been borrowed from ethnography to designate the continuous occurrence of a group of types through time over a reasonably homogeneous space. Like archaeological cultures these traditions are safer to be designated as archaeological traditions. Several local traditions can be clubbed together for a large area and designated as archaeological culture. In terms of Deetz a sub-assemblage through time is a tradition and likewise an assemblage through time is an archaeological culture. This ascendance from the attribute or type to culture requires meticulous search for innovations or introduction of new forms. The causes for changes are subsequently worked out by examining the environmental remains or neighbouring cultures to establish if environmental change or external cultural contacts or both in combination can be responsible for such introductions of new types. Here again, more often than not, the tendency among scientists is to seek an external agency to explain a change. May be a better appreciation of the process in which a type is born within a group would be able to demonstrate in future that in most cases the ramifications within a culture are the inherent quality of every living group.

8. Typological Concept:

Archaeologists have long been concerned with the cultural reality of types. Chang (1967) had in fact squarely put the question "Is there a recognizable, logical and causal relationship between the physical properties and contexts of the artifacts and their relevance to the behavioural and cognitive system of the makers and users?" The crux of the

problem lies in the question - *Are types inherent in the material culture or are they imposed by the archaeologist for the purpose of analysis.* In 1953 Spaulding described a method for discovering cultural types by statistical method Ford (1954) takes the bull by the horn. He describes a hypothetical population— "the Gamma gamma of the Island of Gamma situated in the curious sea of Zeta." He formulates an ethnographic situation and then demonstrates, how in spite of individual variations in the house types, there does occur a model pattern. In other words, the conclusion that cultural types are realities and not artificially imposed seems to be reasonably demonstrated. These show a model tendency which remains consistent although a range of deviations occur to accommodate individual variations. Since ethnography shows a static state of culture which is otherwise a dynamic process, these cultural types and their variations become much more apparent when one is dealing with prehistoric archaeological situations.

In our observable world we are constantly classifying what we see. We do this by attributing certain descriptive meaning to certain symbolic words or numbers. Thus, when a statement like this is made *T-shirts are much more comfortable in such hot and humid climate as that of Madras,* we have chosen a symbolic expression for a top wear in males by the word *T-shirts*. The expression not only helps to classify the possible varieties of men's top wear but also includes a specific morphological and technological description of the object. In prehistory similar designating terms are constructed in order to organize and classify the object retrieved through excavation. Usually these terms have demonstrable historical meaning in terms of behaviour pattern.

Archaeologists generally use two kinds of types. There is a group which is identified as **Natural types**. These include such functional names which were probably the purpose for which the prehistoric community made it. The assumption in this being that the prehistoric man who made it must have had a specific function in his mind and this function is glaringly apparent in the form. For instance, a knife or

an arrow head or for that matter a projectile point could not have been made for any other function than what their names would suggest. These type names, therefore, can be designated as **Natural Types**. It is important to note that natural types are not usually relevant for stone age prehistoric assemblages, nor are they always free of risk in their application. This is mainly because imagination has a role in the creation of the function ascribed by the scientist. The other group of types which are more common in use are **cognitive types**. The assumption here is that the types are born/created according to mental template or idealized pattern mainly decided by the cultural heritage of the population in question. Since the creation of this is through human agency the specific details within them can not be expected to be the exact replica of each other. These minor details may not be the result of any conscious effort of the maker, yet to an archaeologist such details may be of importance to evaluate the process of change in a culture. Hence these are also referred to as **analytical types**.

Types, whether described on functional or cognitive basis, can be further differentiated in three ways viz (i) A **formal type**, (ii) A **metrical type**, or (iii) A **technological type**. A formal type is described on the basis of shape and form, a metrical type on the basis of specific metrical traits within the type and finally there can be possibility of isolating technological features to describe a type. It will be evident from the above that they can be identified simultaneously under all these three ways. For example the cognitive type called **Handaxe** can exist as an Acheulian handaxe on being described on the basis of shape and form (formal type); it can also be called a Cordiform handaxe on the basis of pre-defined metrical specifications (metrical type) and finally it can have such technological characters which might be specific to an area and hence identified under a technique named after the area or site. That is, the handaxe can also be classified as a **Vaal handaxe**, meaning the use of the specific technique of slicing a handaxe thin by a terminal blow which was recorded in sites along Vaal Lake in East Africa. These three typological approaches are to be conceived at three

different levels of analysis. Much confusion can arise if all these different criteria are applied simultaneously to evolve a primary typological spread of a given assemblage. It is needless to emphasize that the criteria of deciding type groups for a given level of analysis have to be of the same kind - may it be morphology or technology or metrical. In Palaeolithic prehistory, however, a combined approach is also possible. That is, instead of calling Handaxe as a type - A *Vaul Cardate* can be identified as the basic type unit. Such combination criteria can, of course, lead to the identification of an unmanageably large array of basic types and hence make archaeological analysis extremely cumbersome. Bordes (1961) recommended a typological list for Lower and Middle Palaeolithic by fruitfully combining morphology and technique of manufacture for primary level and then enunciating sub-types for each of the basic types on the basis of any available minor differences - may it be morphological, technological or metrical.

9. Evolution of Man

It is important to state at the outset that there are a fairly good number of people who are recently advocating the origin of man from as diverse a source as dinosaur on the one hand and life from other planets on the other. Those who had been following organic evolution also are not in agreement about how this process gave rise to man and when. Scientists working through fossils felt that the separation of apes from the line which gave rise to man took place somewhere between 20-30 million years ago. Some molecular biologists, on the basis of the study of albumins, have recently shown that this bifurcation may have been as late as only 5 million years ago. The disagreement about human evolution are too many to be counted in a book of archaeology. We will, therefore, briefly describe the four stages through which human evolution had generally been accepted to have taken place.

Ramapithecus: 10-14 million years old geological layers have yielded some 40 teeth and some 15 fragments of jaws from India, Kenya, Pakistan, China and some other regions of the old world. Since no other parts of their body is known

we have very little idea of their height or walking posture. The most important feature which led them to be our direct ancestors is extreme reduction of their canines and modification of the chewing teeth. These evolutionary changes are impossible unless the hands have been reasonably free. *Ramapithecus* is, as such, believed to have already entered into the direction of specialisation that leads to the 'human kind' (humanization process). Evolutionary significance of freeing of the hand has to be understood at this juncture. Most of the physical anthropologists believe that a group of brachiating (living on tree branches and moving from branch to branch with special adaptation of the four limbs and the tail for gripping) arboreal apes had come down to ground for terrestrial living. The ground living required a different kind of adaptation, and it is believed freeing of the forelimbs is linked with adapting to ground living. Further, it is argued that the nuts and fruits growing on the ground being harder than those growing on the trees, these apes had to develop strong chewing apparatus. The long canines are not very useful for this purpose. In fact chewing requires a great deal of side to side or rotating motion of the jaws and the canines of the two jaws in the case of apes were often interlocked and hence were a great hindrance to this adaptation. It is quite likely that *Ramapithecus* represents one of the first steps of this adaptive process. Ground living did not only require the adaptation of the chewing apparatus but also combating with an entirely different set of dangers which were non-existent in tree life. It is believed that the culmination of all these pressing needs brought about a development of bipedalism. Walking erect made man lose the snout, freed his hand, balanced his head on the spinal column by developing the occipital lobe of the brain, and finally the ability to manipulate the hand to work with the environment. Thus, what was rather an insignificant event of leaving the tree life set off the chain of changes in these apes. By about 5 million years (from today) he was capable of breaking simple natural objects like tree branches or stones to use them for his defence and occasional offence. Meat eating, even if practised, was

more often than not, limited to carcass eating from the leftovers of other predators. The recent discovery, of an about 8 million year old primate skull, reported by Professor David Pilbeam indicates that *Sivapithecus*, which is much more complete than any previously known fossils of this period, is more closely related to orangutan and cannot be a human ancestor.

Australopithecus (africanus) was a light, gracile creature who stood a little more than 4 feet in height and walked erect with a curved back. This form was more suitably adapted to ground and survived during 4 million years to nearly a million years from today. His brain was larger than the present day chimpanzee although his teeth were still in the process of evolving. A group among them seem to specialize in a different diet and developed a barrel like trunk with an altogether robust build. These are identified as forming a separate evolutionary specialization and are called *Australopithecus robustus*. Both these species became extinct 1 million years ago.

Recent evidences from Africa have revealed big colonies of Australopithecines with piles of eaten bones and numerous stone fragments. These evidences leave little doubt about their ability to shape some sharp border by simple breaking of stones and using these sharp stones to cut animals. Most probably they still did not hunt but merely scavenged dead animals. There is increasing belief that the *Australopithecus* co-existed with another advanced variety of ape-men who formed the first member of the hominid bifurcation branch. The eastern rift valley in Africa continues northwards through the Ethiopian highlands. Don Johanson in 1973 discovered an almost 40 per cent complete skeleton from these deposits at Hadar. The deposits could be dated to over 3 million years and the skeleton was named *Lucy*. The find was undoubtedly one of the earliest *Australopithecus* species which may have been the first representative in the line of hominid bifurcation from *Australopithecinae*. It was given the generic status of *Australopithecus afarensis*.

At Koobi Fora region around Lake Turkana another group of finds dating to 1.8 to 1.6 million years along with many

tools and *Australopithecus* remain were described since late 1960s. In 1961, Louis Leakey had announced the discovery in Bed I, Olduvai Gorge of a more modern looking hominid, which he called *Homo habilis* or the hand using man. Thus, the earliest membership in the hominization process that had to be ascribed within our own genus was given to this fossil find. At Koobi Fora *Homo habilis* could be attributed with tool making ability which acted as an added evidence. In other words, the direct ancestor of *Homo erectus* had to be now considered as *Homo Habilis* rather than *Australopithecus*, although wherever *habilis* is reported it is invariably accompanied by a large number of *Australopithecus boisei* finds. Further, it is important to note that there are specialists who would still like to group *habilis* with a somewhat advanced variety of the gracile *australopithecine*. The latter group of specialists, therefore, would find it not difficult to accept that the tool fabrication and manipulation emerged within *Australopithecus* stage.

Homo erectus was much closer to man in looks. His head was more rounded and had a volume of nearly 1225 c.c. (modern man having 1500 and apes 450-600 c.c.). He was nearly 5 ft in height and had strong bones. The earliest of them has been found from Lake Turkana in Kenya and dates around 1.5 million years. The original finds from Java (*Pithecanthropus*) and China were of much younger date (200,000 to 400,000 years) and this demonstrates the long period through which they ruled for forests. *Erectus* was perfectly adapted to making varieties of stone tools the magnum opus of their creation being the Handaxe. More than 60 species of animals have been found associated with these tools. These include elephants, rhinoceros, bears, horses and camels besides numerous smaller species. Sometimes in the long duration of their stay the *erectus* must have domesticated fire because we have evidences of hearths where they must have kept the fire alive. It is believed that big game hunting was possible mainly because of domestication of fire. Herds of these large mammals could be driven into swamps or driven off a cliff with the use of fire and once trapped they could be butchered.

Homo sapiens :

When and how these fairly well equipped *Homo erectus* evolved into a group of early *Homo sapiens* is difficult to demonstrate. The generally held view is that these early precursors of modern man might have evolved between 200,000 to 100,000 years ago in Africa, Europe and Asia. They show no specific or radical change in their life style because they are also found with the same handaxe tool kit of the *erectus*, albeit much more refined. Their physical features are, however, much changed with more strengthening of the chewing muscles and thus putting out of the temporal lobes of the brain (above the ears). They added an array of additional brain faculties. All authorities agree that language must have already developed by the time of *erectus* evolution and therefore that early *sapiens* were equipped with everything that we are biologically endowed with.

Here we must pause to look into the impact of biological evolution on the life style of our ancestors during this period (600,000 to 100,000 years before). Standing erect required a modification of the pelvis which narrowed the birth canal. The growing brain box and the narrowing of the birth canal were two simultaneous evolutionary changes which interfered with each other in the birth of human child. Nature brought about a compromise in this conflict by allowing a baby to be born much before it develops its full brain size. This required lengthening the period of post natal dependence of the new born. Evolution had also taken away the phenomenon of estrus in this group sometimes during this period. This made the female sexually receptive all round the year. These two combined to make human group less stronger and weaker. Whether an ideal family could develop during the early *Homo sapiens* period is difficult to prove but that they were able to organise in stable groups is well demonstrated.

Neanderthals are believed to be a specialized branch of early human races which evolved from the *erectus* stage around 100,000 years ago and lived simultaneously with the early *sapiens* for nearly 65,000 years. That this race

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was a branch of the main line of evolution is believed mainly because his brain capacity evolved to a limit which exceeded that of modern man by 50-100 cc. In spite of his large head his other physical characters remained fairly rugged. For instance, he had large cheek bones and a very prominent brow ridge curving over the eyes and connecting across the nose giving rise to a deep sunken appearance to the nose. These features were further accentuated by a rather broad nose which was perhaps an adaptation to cold climate. Coupled with these facial features, his thick set body with a slight bent and a height of 5 feet gave him a real demonic look. Why such a form had to evolve when the generalized trend in evolution was progressing in a different direction is evident from the fact that they were the first proto-human group who penetrated deep into the north arctic climate. In terms of their geographical spread also the Neanderthals exceed all other contemporary or earlier forms.

Regarding the socio-cultural life the Neanderthals show some very interesting evidences. Their tool kit demonstrates a very specialized series of relatively more job specific flake tools which were successfully used in large game hunting. They are also the first among our ancestors who show evidence of pre-occupation with life after death. They buried their dead with food and tools laid along with the body. Another interesting evidence of their skill and emotion comes from the Shanidar cave in Iraq. Here a 30 year old man has been buried with flowers covering his body (the pollens of the flowers have been found and their possibility of having blown inside the cave eliminated by careful comparison). This is a sentiment not quite uncommon even today. This man had one of his arms successfully amputated during his lifetime. Many other Neanderthal burials are known with evidences of a religious cult connected with the cave bears. In one instance an arthritic old man is buried which clearly shows that even crippled people must have been adequately cared for by them. All these evidences qualify the Neanderthals as very close to us in their attitude and sentiments. Their physical ability and degree of environmental adaptation

was also no less than what was required for a successful survival and yet this race became extinct by 35000 BC with the advent of modern man. A popular explanation given for abrupt extinction of Neanderthals is direct confrontation or a bloody war between these two races. So far, we do not have many archaeological evidences to prove this possibility but that they were eventually wiped out off this planet seems certain.

In the sequel it is important to mention that there are some indications of interbreeding between the Neanderthals and Modern man in the cave sites in Yugoslavia and Israel. It is quite likely that these intermixtures have finally given rise to the Upper Palaeolithic Modern man *Homo sapiens sapiens* or modern man appears rather in an abrupt manner in Europe around 36000 years ago. Right from the stage of its early appearance it shows rather strong internal heterogeneity of form. Many scholars believe that this heterogeneity may have finally given rise to the different racial groups of modern man. One of the most talked of forms of this modern man was found from the rock shelter of Cro-Magnon in France and he is often taken as the ancestor of the modern Europeans. The sites of occupation of this race of modern man are invariably very thick in their occupational debris, and this is taken to indicate a regular population growth among them. They not only migrated all over Europe but their habit of migrating seasonally with their prey made them enter lands which were not inhabited by our earlier ancestors. Thus, the peopling of the New World took place during this period. They must have also devised ways to float and navigate, otherwise they would not have been able to migrate to the Pacific Islands and finally to Australia. The isolated skull found from Niah cave from Borneo can be taken as a direct evidence of this migration to the south-east. There are, however, some very recent evidences coming up from both Australia and North America which shows that these migrations may have taken place in several waves and the earliest waves of migrants to the New World may have been some Neanderthal races and not modern man.

The modern man was not only adapting rapidly to various environmental conditions but his extreme mobility made him develop sharply different cultural habits in different parts of the world. Out of the many significant of his cultural achievements was his extreme preoccupation with visual art. He undertook great pains to draw and paint various figures and motifs in hard rock walls, ceilings and floors. The motive of his art, by no means, can be taken as creations for mere visual pleasure because there are several enigmatic features about them which can be explained only at an esoteric level.

10. Race differentiation

Modern scientific researches have demonstrated that human adaptation within these widely varying environments must have already started the genetic selection processes. For instance Vitamin-D synthesized from solar radiation is both essential as also lethal when taken in large doses. Higher exposure to sun could also be lethal and hence melanin (or the pigment causing chemical) of the skin is activated to protect the body from absorbing excessive Vitamin-D. That is, although all human beings have the same number of pigment producing cells (melanocytes), the rate of pigment production is differently programmed by genetic selection. In the same way mutation may have caused the sickling phenomenon of blood just in order to enable man to adjust within an area otherwise infested with malaria. We have very little possibility of knowing, through archaeological researches, how and when the various differentiating processes in man started. Nonetheless, it is generally believed that man's need to adapt to various kinds of environmental and cultural stresses faced during the Pleistocene period may have been the main cause of evolution and subsequent differentiation.

Coprolite or dried faeces of prehistoric man have been analysed to see the pattern of food man has been eating. Many interesting informations regarding his preferences of specific edible plants out of a large available variety (known through palynology) can be demonstrated through this study.

Similarly, palaeopathologists, through their study of skeletal remains, have demonstrated that arthritis was perhaps one of the most common ailments suffered by prehistoric people. For comparatively recent periods evidences of many other diseases, which leave a permanent mark on bones and teeth, have also been recorded.



Measuring Time



In many ancient societies time was never considered a measurable unit. To them if time was measurable one should be able to hold a basket full of time -the basket being the unit for measurement known to them. Measuring tangible objects must have been there since the prehistoric period, but time being not tangible requires conceptualization. In pre-literate societies one can often come across dating the age of an individual in reference to a memorable natural event. Ancient Egyptians and Babylonians are believed to be the earliest to attempt a calendar on the

basis of astronomical and climatic events. Most of these calendars and their method of construction are today in semi-obscurity but these attempts can demonstrate man's curiosity of calibrating the past into some comprehensible units. The calendar is a product of our civilization which measures the past in such units as *years, month and days*. In dealing with prehistory such units are hopelessly useless and hence new units are required to be defined. The prehistoric units for the measurement of time are mainly in the form of a variety of climatic events of worldwide nature and hence these can never be as precise as our calendric units. One of the most important involvements of most prehistorians, therefore, lies in reconstructing the past climates of a given area and then correlating this with a broad successional sequence of worldwide events in order to pin the new area within a specific stage of this sequence. There are a large number of scientists working in various natural science disciplines to obtain a calendar year estimate for these events or even to date given prehistoric objects. The dates obtained through these allied agencies and expressed in units of years are termed as **absolute or chronometric dates**. It is needless to emphasize how wrong this term is, because all such estimates are very tentative and have a large range of plus-minus errors in many cases. The rest of the approaches to dating give only indirect estimates called **relative dates**. We shall briefly enter into all these dating techniques just for a basic awareness of the beginner, because in most cases these principles and actual working are very much outside the area of interest of average prehistorians.

1. Relative dating :

(a) **Stratigraphy**: One of the simplest approaches to chronology is based on the principle that the lowest layer in any natural process of deposition is older than the ones above it (provided there has been no disturbance). The youngest phenomenon under the same logic will be represented by the topmost layer. The succession gets reversed if the depositional agency has the power of constantly getting lower in level through time. The classic example of this kind of stratigraphy is recorded in many

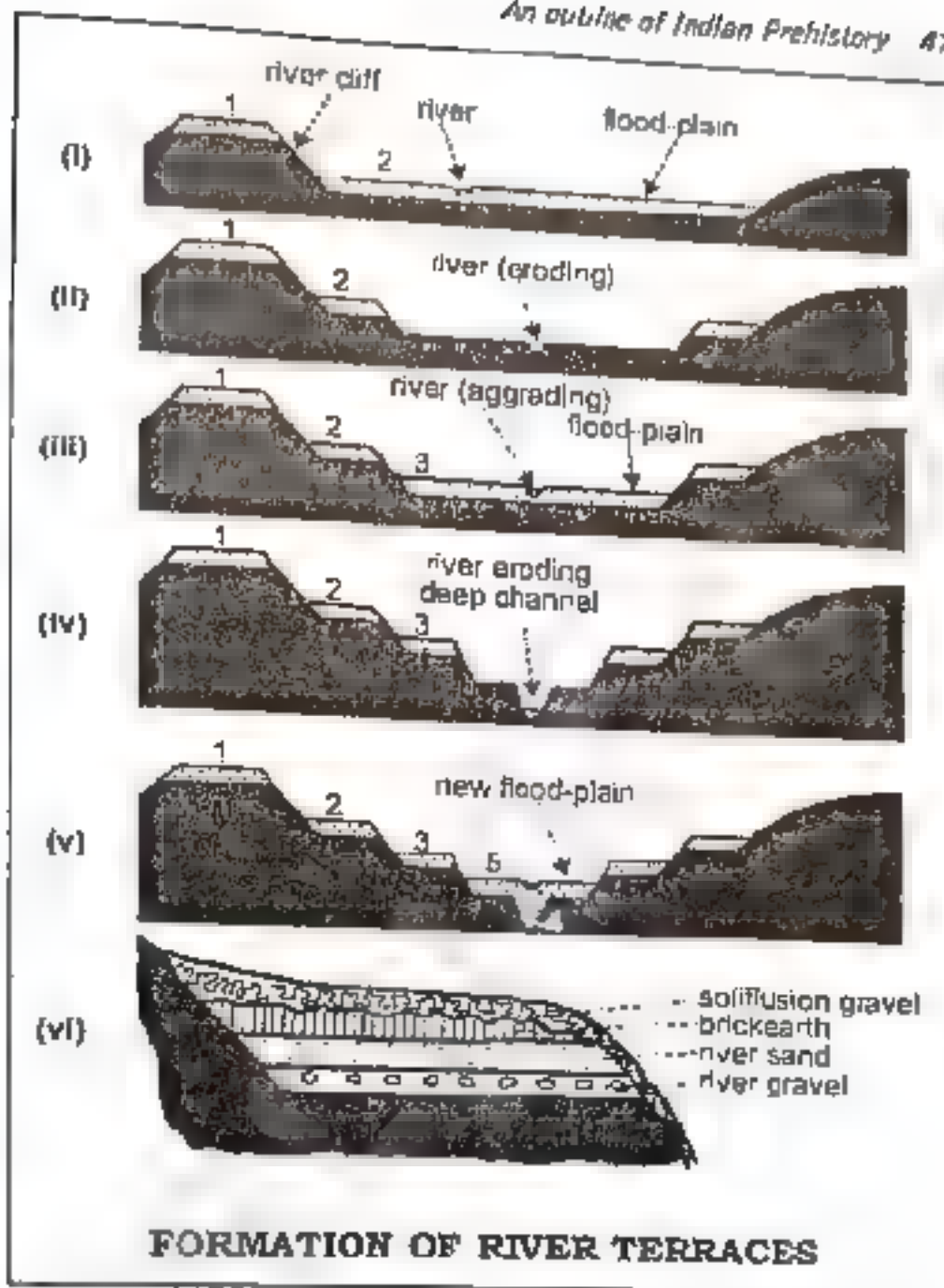
river banks in the form terraces. Thus, in a **terraced stratigraphy** it is often the topmost layer or more correctly terrace, which is the oldest and the lowest layer the youngest

(b) The Pleistocene: The Pleistocene is an epoch which forms a part of the Quaternary period which in turn is a part of the Cenozoic Era. Various other divisions of the era and the periods contained within it are given in every book of palaeontology but do not concern us in prehistoric archaeology. The Pleistocene epoch is the epoch within which man evolved in the form of *Australopithecus*. The beginning of this epoch is believed to be anywhere between 5-4 million years from today and is defined in terms of the first appearance of some marker fossils. These are as a group called **Villafranchian flora and fauna** and include the ancestors of modern cow (*Bos*), elephant (*Elephas*) and horse (*Equus*) on land and *Hyolithes baltica* in sea. Most of the estimations done so far to fix the date for this event (viz, to mark the beginning of Pleistocene) indicate the Pleistocene epoch to have started around 5-4 million years ago and ended around 8,500 B.C. To every prehistorian this epoch is of extreme importance because just before its beginning *Ramapithecus* separated out to form a line of human evolution and throughout this period man passed through at least 4 broad evolutionary stages and a minimum of about 12 different cultural stages. It is only after the Pleistocene ends that man starts domesticating plants and animals. Pleistocene epoch is marked by a rhythm of several glacial advances over Euro-Asia and the Americas. All these periods of glacial advances were not of equal intensity, neither were the intervening warm periods of the same type. Some scientists believe that during the height of these glaciations compact ice of 2000 to 3000 mt. thickness stayed over the land for several hundred thousand years. The enormous amount of water trapped in the land borne ice caused severe lowering of the sea level exposing land bridge between many islands and the adjoining main lands. In many favourable coasts these ancient beaches have been found and named corresponding to the Alpine glacial order. The glaciations which descended down from the north pole accompanied glaciers of all

		Glacial	Interglacial	
P L E I S T O C E N	U P P E R	WURM	Eemian	10,000 years BP
				150,000 years BP
	M I D D L E	RISS	Hoxnian	400,000 years BP
		MINDEL		
	L O W E R	GUNJ	Cromerian	4 million years BP
			Villafranchian	

glaciated mountains gliding down to lower plains. In Europe the glaciers have been identified by giving them names of rivers on the Alps. There are several synonyms used for each of these names in different parts of Europe, Asia and Americas but to avoid complications we will use the Alpine names only.

The estimation of dates of 5 million to 500,000 years is done through a radio-active isotope disintegration technique known as Potassium Argon method while dates upto 90,000 years are done by a similar method based on Carbon isotopes. The rest of the dates lying between 500,000 years to 90,000 years are done through relative dating techniques and hence are very tentative. Before we go into these methods of dating it will be important to understand how the glacial/interglacial chronometer is applied in practice. A large number of plant types (described and defined through the identification of their pollens in soil) and animal types (described and defined through the identification of their skeletons, remain in soils) specific to each of these climatic stages are established as a guideline. Any prehistoric site in which these indicators of environment are found associated along with the cultural debris, the dating becomes relatively easy by comparison of the latter with the established guideline. In many cases, in spite of these faunal (animal) and floral (plant) availability a precise date



may not be easy to arrive at because the faunal and the floral types found may be the ones which show no change of form for a relatively large part of Pleistocene. In other words, what is taken as archaeologically more fortunate is the availability of what is called the marker fossils. Marker fossils are those which are known to change into different **species** or **sub-species** at known periods within the Pleistocene.

Thus, insects, reptiles, fish or even some forms of mammals are quite useless in ascertaining the specific period within Pleistocene. Certain sub-types of elephants and rhinoceros have been found quite useful because they have changed into 3-4 different sub-species during this period. When no marker fossils are not available the archaeologists use any method - from soil chemistry to methods of soil deposition - by air or rivers in order to link them back indirectly to one of the 7 broad stages in the above table. The actual process of obtaining a chronological status for a given deposit is in reality an extremely long one. Recently experts in palaeomagnetic reversals recorded the actual date of reversal of the north pole into south pole. In the last 3 million years the north pole of the earth seems to have become south pole 10 times and each of these reversals has been named and dated.

2. The tropical rivers and lakes :

Almost all rivers and lakes in the world are getting narrower and shallower because of the tons of debris that they have accumulated during the past. A series of stable periods have caused down cutting of the bed and eventually changing the course. Deposits brought by the river in the past have sometimes been found more than a kilometer away from the modern flow of the river in a terraced structure. Studies of these available terraces in African and Asian rivers demonstrate that tropical regions of the planet underwent an excessive rainfall period during the time glaciations were occurring in the temperate regions. During these heavy rainfall periods the rivers accumulated huge amount of debris which were eventually discharged when the water content dried up and could no longer carry them. Thus, a series of boulders or gravels are found in stratified deposits along the banks of all ancient rivers and lakes. The periods of high rainfall are called **pluvials** and the dry periods between two pluvials are called **inter-pluvials**. There are 4 such pluvial deposits found in East Africa and these pluvials are termed as **Kageran**, **Kamasian**, **Kanjanan** and **Gamblian**. Possibly these were occurring in the same general time period when Europe was recording the four glacials, i.e., Kageran during Gunz, Kamasian during Mindel,

Kanjeran during Riss and Gamblian during Wurm. Some parts of Africa record two more wet phases after Pleistocene and these are named **Makalian** and **Nakuran**. The evidences known till date seem to indicate that in India although there might have been as many wet phases as in Africa but most of the rivers were not born in the initial phases to record them. The earliest deposits recorded may not be older than the **Kamarian** in some rivers while in others it might have been even younger than this.

3. Fluorine dating

All bones and teeth are mainly composed of a phosphate named hydroxyapatite and the ground water in most places contains fluorine. If therefore, a bone is lying buried in the ground, the fluorine from the water is absorbed by the bone to form a stable chemical compound called fluorapatite. The amount of fluorapatite in a prehistoric sample of bones can, therefore, be taken to discard younger incorporations. Since many of the fossils of early man have been found washed up at the shore of water sources or simply on the surface, this method can at least establish the relative antiquity of the finds.

4. Pollen dating or Palynology

Pollen are small grains released by different flowering plants. These have excellent preservative ability and are also different in structure for different genera or types of plants. Recovering the pollen from prehistoric soil can help reconstructing the plant life of the environment of that time. Since plants are extremely sensitive to the climate their relative proportion through a depth of stratigraphy can sometimes reveal the process of slow change of environment during the period of soil deposition. The relative proportion of large trees or arboreal plants (AP) and grass and bushes or non arboreal plants (NAP) has often been used as an index $(AP/NAP \times 100)$ to establish a tundra from a thick forest in many stratigraphic profiles.

5. Seriation

This is one of the most popular and useful methods of relative dating available for comparatively younger periods

in Archaeology. Basically it involves identifying major stylistic changes in a given type through a period of time. If the frequencies of people using a specific style in a given time are represented as horizontal bar and the frequencies of its use in successive periods are likewise arranged, then we observe the so called "battle ship" --i.e. there are very few people who start using the style on its emergence and slowly its popularity increases (the middle of the ship) and finally again the popularity decreases. If this series constructed for a given type has some absolute dates, then any surface collection within the area can be ascribed a date by comparing with this battleship design. Recently the method has been used with sophisticated statistics to attempt automatic arrangements of units into a series. Stylization in ceramics has been very successfully dated with this method.

6. Chronometric dating

This most widely used dating technique can be grouped as radio-isotopic methods, the theory of the most well known of these, called radiocarbon technique, was first given in 1940. It is based on the fact that solar radiation striking the upper atmosphere converts a small amount of the atmospheric nitrogen into radioactive isotope-Carbon-14. Since all living organisms exchange gases with the atmosphere the amount of Carbon 14 in their cells soon reaches the same levels as in the environment. When the organism dies the trapped Carbon 14 in the cells begin to disintegrate back as nitrogen. Laboratory experiments have established that half of any amount of Carbon 14 disintegrated in 5730 years (that is, its **half-life** is 5730 years). By measuring the amount of radioactive carbon left in a prehistoric organic remain one can calculate the time that has passed since its death. This method can give reliable dates upto about 50,000 years after which the radioactive carbon left is too little to be measured.

Potassium-argon dating is based on the same principle but can be done only on rock or volcanic ash samples. It is because Potassium-40 is known to be constantly decaying into a gas called Argon-40. The **half life** of this disintegration is about 1.3 million years. Since Argon is a

gas, it escapes when the rock is molten like in lava but gets trapped when it cools. The trapped amount can be measured from volcanic deposits. Most of our prehistoric sites cannot be dated by this method because they do not occur in volcanic ash and also because dates lesser than 500,000 years become unreliable. In other words, between 500,000 to 50,000 years i.e. the entire length of Middle Pleistocene and a considerable part of Upper Pleistocene are not datable through any radiometric method.

Dendrochronology is another chronometric method of dating which is of limited applicability. The cambium lying between the wood and the bark forms rings during yearly growth period of a tree. It is a common experience to see these rings in trees cut across the trunk. These concentric rings maintain minute differences of structure for each year depending on the temperature, humidity and age of the tree. Certain trees, especially bristlecone pine (*Pinus aristata*) found in California has provided different ring structures for as many as 4,900 years. Each of these structures is plotted against their year of formation calculated from the outermost ring dated to the year of its cutting. Finally the prehistoric sample of unknown date is compared for its ring structures with the already identified structures. This technique has been successfully used in dating many Palaeo-Indian habitation sites. For most of our prehistoric period this technique cannot be used simply because of lack of any surviving wooden sample. This technique has, however, played a very important role in correcting the earlier obtained radiocarbon dates. It was found that the assumption that every living organism all through the past had maintained the same amount of Carbon 14 in their cells, as a present day living organism does, was not entirely correct. Hence many radiocarbon dates showed younger values for older (real) dates. With bristlecone pine dates radiocarbon dates have been corrected for 1000 to 4000 years. All radiocarbon dates are written as BP (Before Present) which by an international agreement is meant to be before AD 1950.

Varve analysis is another chronometric dating technique used successfully in obtaining the age of some prehistoric

4.4 An outline of Indian Prehistory

even though it is based on the principle that glacial lakes have an elevated amount of water in the summer than in the winter and therefore the thickness of the fine clay deposition in the lake will be more in summer than in winter. Physical characteristics of some other valleys or basins can be used to estimate the age of the lake as also the time taken for it to be formed. This method has successfully demonstrated the exact time of the end of Pleistocene in the Indian subcontinent covering most of Scandinavia started receding. Prehistoric sites are seldom found by glacial lakes and hence this method has no direct utility in prehistoric culture datings.

Fission Track dating is based on the principle that unstable atoms decay by emitting alpha particles which causes fission track damage on the surface of the material. Volcanic glass or some other minerals known to contain uranium allow these decays to be seen under microscope. If the total amount of uranium present in the sample and the density of the tracks can be counted, the ratio between the two gives the age of the sample according to pre-determined constants for the rate of spontaneous decay. This method is still in its experimental stage and is applicable only on object having a glassy surface.

Thermoluminescence: Many materials including clay and stones can store energy by trapping electrons from ionization. This energy is stored until the material is heated. On heating, this energy is emitted as a glow and this is termed as thermoluminescence or simply TL glow. On cooling, the alpha particles are again absorbed by the material. The rate at which the energy is reabsorbed since that it being can be calculated in the laboratory. Thus if a prehistoric ceramic surface can be energized to estimate the number of alpha particles reabsorbed since it was last heated, the period elapsed since its last use can be computed.

Obsidian hydration: Obsidian is black opaque glassy rock which is also referred to as natural or volcanic glass. This stone has been abundantly used during recent prehistoric past. Whenever a fresh obsidian nodule is fractured, water

from the environment starts getting absorbed in the newly exposed regions and forms the bond of obsidian hydration layer. The rate of hydration formation can be determined in the laboratory under controlled conditions. The thickness of hydration layer found in prehistoric obsidian sample can then be converted into years by using the rate of hydration. This method is very easy and also cheap but can be used only on obsidian and hence is highly limited in its applicability.

Archaeomagnetic dating is another chronometric method of dating which is limited in its applicability to regions for which accurate data of earth's magnetic field and angle of Dip etc. are recorded for last several hundred years. Since such data are not available beyond 1600 AD its applicability to prehistory is ruled out. For Palaeo-Indian habitation sites, however, it has been fruitfully utilized. The technique is based on the principle that clay has impurities of ferrous salts which are magnetic in nature. When a prehistoric fire hearth or kiln is heated its magnetic impurities develop earth's magnetic field for that region for that period. If magnetic data for the region through time are available a mere comparison can show in which year it was fired.

7. Some recently developed methods

Human bones contain several amino acids. When polarized light is thrown on them some of these rotate the light to the left while there are others which rotate the light to the right. The former types of amino acids are called l-isomers and the latter are called d-isomers. Most of the amino acids when found in living proteins are l-amino acids but when the organism dies these slowly change to the right rotating or d-isomers. This phenomenon is known as **racemization**. It was demonstrated that the racemization of a specific amino acid called aspartic acid, takes place in the period between 5000 to 100,000 years. Many prehistoric bones are now being subjected to the identification of d-isomers of aspartic acid in order to estimate the date. There are some successful dates also available from this technique.

Another method proposed is to estimate the rate of patina formation in a kind of rock called lymanite and through this

estimate the date of prehistoric debris in which these moraines are present.

There are many other dating possibilities which are being constantly investigated in various laboratories but these researches are completely outside the arena of archaeological research.

8. (i) **General Environment during Pleistocene.**

It is true that the evidence of huge glaciers gliding over the land in Europe and America is demonstrative from the debris they have left behind, the effect of these ice sheets staying for sometimes, as long as 100,000 years, needs to be better understood.

It is believed that during at least the last two glaciations the climate of northern hemisphere was nearly four times colder than the present arctic region. Rocks and boulders pushed along the top of the advancing glaciers made mounds along the top of the limit where these glaciers stopped. Such deposits are called **moraines**. Moraines are studied by geologists to find out the path and extension of various past glacial episodes. The annual temperature during the peak glacial periods went as far down as -100°C while during much of the interglacials the temperature did not rise beyond 0°C to 10°C . During the stay of the ice the ground water was completely frozen (**permafrost**) and hence the water molten from the weight of ice could not get absorbed in the ground. This created an expanse of slush around the top of the moraines. Advancing glaciers furrow through undulating land surface and in the process discharge a great deal of dust in the air. This dust is carried by strong wind currents created due to the cooling of surface air. This wind borne dust (called **loess**) is found deposited to great heights. These loess deposits often yield a very rich assemblage of faunal material. During inter-glacials it is not only the sea level that rose by more than 100 metres but in many places the landmass also got raised because of the release of the tremendous weight of ice. These fluctuations had considerable effect on the vegetation zones of the area. Studies show that the timber line had been swinging back and forth by sometimes as much as 10 degrees of latitude.

In the tropical zones effects of excessive rainfall are visible along the rivers and lakes but the environmental temperature was much lower than in winters today. As a result of this many of the plants and animals found in these zones seem to be tolerant in temperature fluctuations. Grassland and Savanna dominating the non-equatorial zones accommodated a large variety of animal types. The interpluvial dryness accompanied the temperature rise and spread of grassland and desert almost to the periphery of the equatorial regions. Active pluviation had again changed these regions into thick rain forests. The various climatic zones identified today are described below with their environmental characteristics. For reconstructing prehistoric climate the understanding of the characteristics of these present day zones comes quite handy.

Tundra It is a vegetational condition which is negatively defined. That is, it refers to areas where no vegetation grows. There can be two different kind of tundras, the one which is found in the polar regions and at high altitudes in the temperature zone, and the other in the deserts. Both are caused by lack of water in the soil. In cold tundra the soil water is frozen and hence can not sustain any plant life while in deserts there is no usable water in the soil. Discontinuous mosses, sedges or lichens in the polar tundras and shrubs or xerophytes in the desert tundras are the usually occurring vegetations. One can perceive several sub-zones of the Tundra on decreasing climatic severity. Such terms as HERBACEOUS TUNDRA or even TRANSITIONAL FOREST-TUNDRA are used to designate such shades or climatic variations.

Steppe: It is a term used to designate grass-land environment. Seasonal moisture maintains very long grasses and other herbaceous plants over large stretches of land over the mid-latitudes i.e. 30° to 40° N and 30° to 40° S. These occur in areas where winter temperature reaches very low limits for more than 4 months in a year, where exceptionally low temperature is maintained over a long period of time-as long as 4 months at a time. The summer and spring precipitation is not enough to maintain arboreal (plant) life. As such, thick clods of grass with the

network of their roots sporeading far and wide, come into their own. These roots are destroyed during winter and subsequently putrified to provide nutrition for the growth of plants next spring. Steppe land can develop both in the periphery of the tropical forests as also in Tundra. Thus it forms a specific kind of gradation of both the extreme forms of vegetational regimes.

Tropical Forest or Tropical Rain Forest: This is a term used to designate an extreme form of vegetational regime. It constitutes a thick growth of hygrophytic, evergreen, broad-leaved vegetation. Several layers of trees grow in succession with their canopies reaching in height many times the mark of 50 metres. The distance between the trees can also get reduced thereby, sometimes to as little as a meter. Lianas and climbers occur in profusion where grass or any other kind of undergrowth is virtually absent. Normally this kind of vegetational zone occurs between 10° N to 10° S where humidity constantly remains above 90 percent all round the year. In South East Asia the Rain Forest extends almost upto 20° N. Whenever this kind of forest develops a gap in its overhead canopy (because of the soil conditions below), sun light penetrates it right upto the ground and a dense undergrowth takes birth. Regions where the rainfall is not uniform and comparatively drier summers occur, the Rain Forest starts growing deciduous vegetation and trees and soon a mixed forest results.

Savanna: This is a term used to indicate a transition from a proper Rain Forest to a Steppe gradation. Grasslands interspersed with isolated trees of both the evergreen and the deciduous variety occur in this kind of a climatic zone. This is a characteristic feature of the vegetation found all over the sub-humid tropics. Lighter tropophytic plants are a commonly found constituent of these forests. This is also referred to as the **Parkland phase** in some countries. Usually regions maintaining rains continuously for more than 6 months in a year develop this form of ecology. It is believed that more and more of the Tropical Rain Forests of the world are fast metamorphosing into Savanna in their characteristics because of their overexploitation by man.

The identification of all stratigraphic units in a given deposit necessitates through investigation of the soil and its gradation. Frost weathering (cryoclastism), particularly evidenced in the soil sediments in caves and rock-shelters, is indicated by laminated and angular chunks layed over soft soil. Such deposits are often referred to as **shoals** or **talus** in archaeological literature. Weathering of a sediment during wet phase is identified from the amount of carbonate that is leached through the soil. The length and severity of the wet phase, naturally, can be attempted by quantitative chemical analysis of the soil. A special kind of *in situ* weathering of rocks in the tropical countries called **laterization**, may be described at this juncture. This is a process by which the clay minerals of the rock are broken down during excessive rain thus enriching the weathered surface with minerals. These minerals are later crusted by a process of irreversible crystallization. Laterites are rich in iron oxides and are brick red in colour. Forested rocks around the tropics are known to have lateritic deposits well over 10 meters in thickness. Seasonal rains wash these oxides of iron and deposit them along the lower valley drainages. These secondary deposits of laterites are called **detritus laterites** or simply **detritus**.

The agency which causes a soil deposition is identified through sedimentological studies. The deposits caused by permanent course of water flow (river) are called **alluvial** or **fluvial** deposits. The ones caused by lakes are called **lacustrine** deposits. The ones caused by wind are called **aeolian** deposits. Finally those caused by advancing glaciers are termed **moraine**. The degree and duration of these agencies at a given place is often attempted through grading of the soil samples from these deposits. Various soil grading standards are being followed in various labs. Here we may give an example from one standard:

Blocks	10 - 10 mm in diameter
Granules	10 - 5 mm in diameter
Gravels	5 - 2 mm in diameter
Sand	2 - 0.5 mm in diameter
Silt	0.5 - 0.002 mm in diameter
Clay	0.002 mm or less in diameter

If 100 gms of soil from any deposit is estimated for these gradations and expressed in percentages, any deposit caused by a forceful agency will tend to incorporate very high percentage by weight of the larger components while lesser the force the finer the particles will become. Such sedimentological graphs, when drawn through time, can indicate how the climatic phenomenon controlling the agency has fluctuated in the past. These climatic fluctuations are then established by faunal and floral analysis. Hence an extreme dry and hot period between two extreme wet and humid periods can be easily diagnosed on the basis of sedimentology. The temperature fluctuation if present for a long enough period of time can be more easily understood from the vegetable and animal remains. A combined interpretation of climate of a period through a multipronged analysis of a given deposition leads to defining stratigraphic units.

The changing climate of Pleistocene is also marked by changes in the fauna and flora in various parts of the world. While the flora has either to adapt to or perish with adverse changes in the climate, the fauna in many instances survived by migrating to regions of milder climatic stresses. In cases of long periods of climatic changes evidences of fauna also having adapted to the changed situation may not be entirely unknown. Pollen grains studies (Palynology) from deposits in north west Europe show that early Pleistocene supported *Azolla tegelensis*, *Tsuga*, *Najas intermedia*, *Pterocarya limburgensis*, *Trapa natans* and *Carex intermedia*. These floral forms are usually referred to as Tiglian after the Tegelen clay in Limburg in Netherlands where they were identified. The subsequent warmer phases see the evolution of *Microtus* and *Minomys*. The *Azolla feniculoides*, *Corylus* and *Abies* are introduced successively. The last interglacial is marked by high proportion of hazel and horn bean in Europe. *Betula pubescens*, *Populus tremula*, *Pinus sylvestris* and *Alder* are the other floral types that characterize this phase.

The identification of a flora involves the analysis of pollen or microscopic investigation of charcoal remains. Usually Palaeobotanists are specially trained for this kind of work.

The percentage of each genus and species of plant is computed from the total of the pollen in a given sample. Finally what is known as the "pollen spectrum" of the deposit is constructed. For ecological interpretations certain groups of the plant types are made such as "hydrophilous" and "heliophilous" plants. A high percentage of the former group will undoubtedly indicate a wet environment. A predominance of the heliophilous group of plants, on the other hand, will indicate sunny open spaces. Similarly, the proportion of arboreal plants (AP) to non-arboreal plants (NAP) in a given specimen can indicate a grassy steppe (high NAP) or forested environment (high AP) during the past periods.

The faunal finds from each of these periods help in fuller understanding of early man's environment. The Villafranchian stage in Europe is marked by such large mammal forms as *Elephas meridionalis*, *Dicerorhinus etruscus*, *Equus stenonius* and *Trogontherium cuvieri*. Of these *Elephas* and *Dicerorhinus* show important evolutionary changes during the Pleistocene and thus act as two extremely helpful markers in archaeological datings. *Elephas* (*Archidiskodon*) *meridionalis* in Europe and *Elephas planiformis* in Asia are found till Cromerian faunal stage beginning from the early stages of the Villafranchian. By the beginning of the Mindel glaciating these early elephants give rise to straight tusked *Elephas palaeoloxodon antiquus*. These straight tusked elephants survived till Wurm. The *Mammuthus trogontheri* seems to be another variant evolved from the ancestral *Elephas meridionalis*. From an ancestral form of mammoth also developed the *Elephas mammothus primigenius*. It is found in Riss and disappears in Wurm.

Similarly, *Dicerorhinus megarhinus* and *Dicerorhinus etruscus* of the Villafranchian stage are found to survive upto the middle of Mindel in Europe. It gives rise to the *Dicerorhinus karchbergensis* (merckii) and *D. hemitechus* in the subsequent period. These two forms continue to occur till the early phase of Wurm. During the height of Mindel glaciation the Woolly rhinoceros *Coelodonta tichorhinus antiquitatis* evolved somewhere outside Europe and

migrated in every peak glacial phase. Besides these large mammals European Upper Pleistocene witnessed the emergence of such forms as *Megaceros giganteus*, *Hippopotamus amphibius major*, *Equus*, *Capellus silvestris*, *Oribos maschatus*, *Felis leopelueus*, *Rangifer tarandus*, *Bison priscus*, *Cervus elaphus* and many other well known modern animals

Faunal and floral analysis can help to reconstruct past environments to a large extent. Certain animals can thrive in certain kinds of habitat. They also maintain symbiotic relationship with a set of other animals within the same habitat. Further, a certain kind of temperature, moisture and soil alone can provide the specific vegetation pattern for maintaining this animal population. Most geochronological ascriptions are, therefore, entirely dependent on researches on these diverse branches of knowledge (geology, botany, zoology.) We not only measure time on the basis of establishing climatic succession but we also learn a great deal about past environments with which our ancestors interacted.



Prehistoric Techniques and Types



Man started his cultural career on a very adhoc attempt to obtain a sharp cutting edge. His loss of canines and powerful nails through evolution made it necessary to seek environmental help. Evidences show that the adhoc beginning had slowly taken a grip on him. He not only standardized working with a given raw material from his environment but slowly experimented with different raw materials. Thus newer techniques had to be evolved at every stage. The need of a sharp edge was also being slowly replaced by a variety of other needs. The history of man's cultural

progression is basically a history of his technological progress. Cultural terms such as **Stone age**, **Copper age** and **Iron age** are also essentially attempts to divide cultural traits with a definable technological stage.

1. **Earliest or Palaeolithic**

Man must have begun his experiment with his environment with wood as a raw material. This must have been the easiest retrievable raw material available in the form of branches of trees in the open forests but evidences of that stage are destroyed for ever and hence cannot form a part of any archaeological investigation. Stones are the other raw material which became quite useful to man. He found it so suitable for his needs that he continued using it for nearly a million years adding some ivory and antler only at the lag end of the period. Even after he developed techniques of metal retrieving he did not entirely give up his age old love for and habit of stone. The techniques in which these stones have been shaped by him are usually reconstructed by controlled experiments by the archeologist himself. These experiments can result into a fuller understanding of some fabricating techniques. Here we can summarize some important features of stone technology.

When a given stone needs to be broken with another stone, the hammer stone needs to be bigger in mass than the piece to be broken. Further, choosing a harder raw material for this purpose can also serve the purpose. For instance, for flaking flint or quartzite granite, basalt, dolomite or similar rocks used as hammer stones can be quite useful. In case of non-availability of harder rocks the stone to be flaked can often be broken by dropping it on ground and then the smaller pieces picked up to shape into tools. When a piece of rock is chipped at convenient corners (**flaking**) and then used, the pieces of stones knocked off are waste flakes and the tool is a **core tool**. When the reverse is the case, that is, when the piece of stone merely acts as the source of producing flakes and these flakes are further shaped (by **retouchings**) then the shaped pieces are called **flake tools** while the core is a waste. It is obvious that in the case of a core tool the length of sharp border obtained is extremely low in relation to the energy spent on it, whereas in case of

a flake tool. For same energy we produce 10 to 20 times more sharp surfaces. Thus, in terms of efficiency a culture dominated by flake tools can be much more advanced than a culture dominated by core tools. Identification of a flake tool can be done by mere size as there can be cores smaller than large flakes. Here we have to take the average width of a core as the **positive bulb of percussion**. I have been told that when force enters a stone it imprints an elevated bump on the inner surface of the flake right under the point where the hammer hits it. The surface on which the hammer hits is known as called the **striking platform** and the point on the platform where the hammer hits, is called the **bulbar scar** or **flake scar of detachment**. The corresponding area on the core is called **flake scar**. This flake scar on the core maintains a deep point corresponding to the positive bulb and this is called the **negative bulb of percussion**. Since a large flake can always become core in relation to the next flake removed from it, the usage of the terms core and flake becomes relative. Since relative terms are useless in scientific analysis, a flake in archaeology is decided to be any piece of stone which maintains a positive bulb of percussion no matter (a) how small or big it is and (b) no matter how many flakes may have been removed from this. The surface of the stone which bears no evidence of human workmanship is called **original cortex**. Such a surface, in case of a pebble is much more apparent than on chunks and boulders naturally derived from hills. Finally we need to introduce the term **retouchings** in a more specific way. Retouchings are median to small sized chips removed in a contiguous manner along a border. These differ from flakings in only the purpose. While flakings are aimed at removing stone material, that is, to thin out or obtain a slope, retouchings are aimed at regularizing a border or strengthening it. Any unworked stone flake has razor sharp borders but these borders are damaged easily. The angle formed by the two surfaces at a sharp natural border can be as low as 7° - 10° . Retouching increases this angle to as much as 20° - 30° . The difference of the functional ridges in the above two cases is the same as a safety razor blade from a sturdy pocket knife.

(2) Primary fabrication techniques

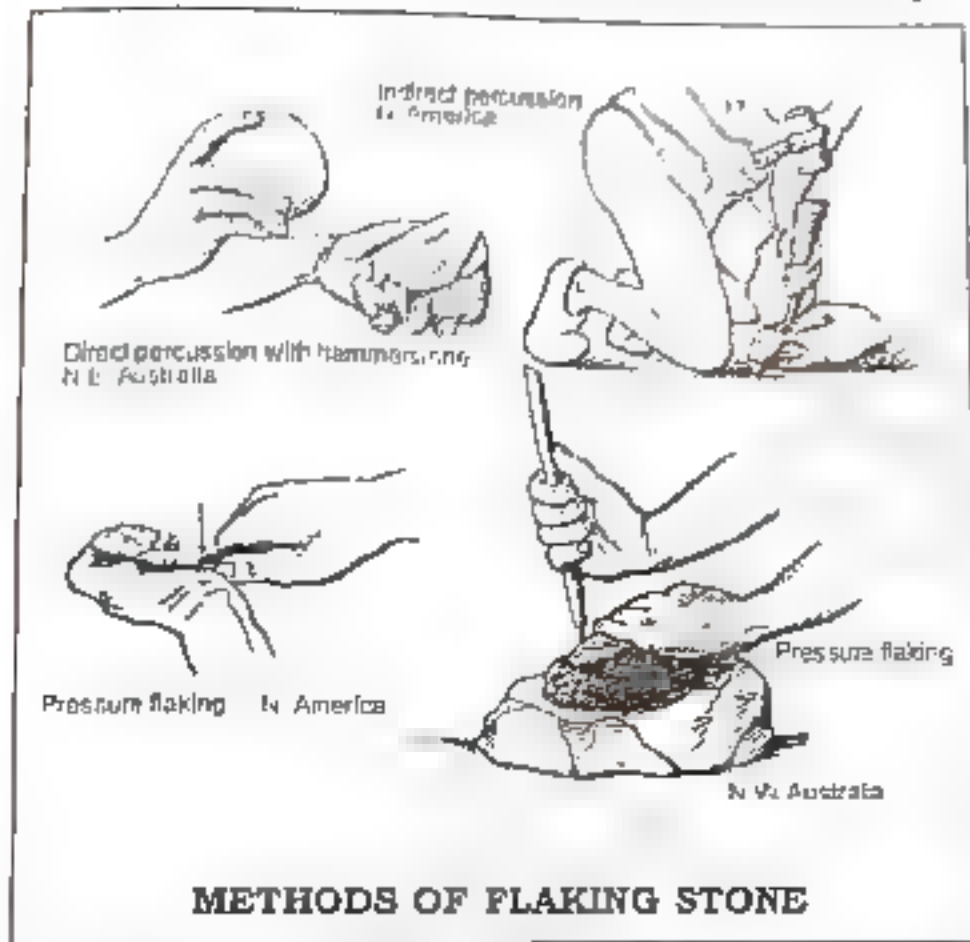
(a) **Direct percussion:** This was the most common method adopted by prehistoric man in which the stone hammer hits the stone in a swinging blow. Maximum amount of force enters the stone in a rather uneven distribution. It results in a great deal of shattering effect. The blow is pronounced and has a fairly large outer circumference. This method of technique is also referred to as **free flaking technique**.

(b) **Block-on-Block:** In this technique the pebble or lump of stone to be worked is struck against the perpendicular end of a large fixed stone or anvil. The blows produced in this kind of flaking can be really pronounced as the force with which the stone hits the anvil is supplemented by the natural weight of the rock.

The above methods have a risk of having no control over the fracture and hence can often defeat the purpose. The following controlled methods of stone fabrication were evolved to overcome this risk.

(c) **Step or resolved flaking:** As the name signifies the flake scars produced by this technique are shaped like a step. Here the hammer directs the force inside the thicker part of the stone in contradistinction to force directed outwards in the case of free flaking technique. This restricts the force from traveling over the entire thickness of the stone and as such the force gets spent up after traveling half way through. As a result of this a crack develops on the surface of the stone along the periphery of the termination of the force. This results in a vertical cleavage on the surface as also a horizontal scar (when seen from top). It has a chiselling effect which enables cutting the borders without sacrificing the thickness.

(d) **Cylinder hammer or hollow hammer technique:** Tools with unusually shallow and elongated flake scars were discovered in prehistoric debris. Dr Leakey after experimenting with many kinds of hammers declared that such flakings could only be effected by using a hollow bone or antler or a wooden hammer. On the face of it this method might appear to be improbable, but only experimentation can demonstrate how good flakes can be removed by this



technique The greatest advantage of using these organic hammers is their property of absorbing the reaction of force - thus totally eliminating the shattering effect of impact. The bulb produced in this kind of scars is diffused and the flake scars have a more or less parallel running boundary ridge

Besides the above two, there are two other controlled flaking techniques which are usually employed for finer tools.

Punching technique: It involves the use of an intermediate puncher which receives the blow on its top and transfers it to the core through the other end. Such a method has the advantage of controlling both the magnitude and direction of the force by manipulating the puncher by one hand while the force is being delivered by the other. The peckings in Neolithic celt preparation are done by this process. This method is quite useful in knocking off undesired corners or protruberances on a rock surface without the risk of

undesired damage to the tool

Pressure flaking: Some Palaeolithic tools like the upper Solutrean points carry fine shallow flakings on the surface and these were taken to have been produced by what is described as pressure flaking technique. In this technique the media (puncher) transmitting the force keeps in contact with the core during the process the force is in action. This prevents radiation of the force waves in radial direction at the point of impact. (In most of the percussion techniques the hammer swings off after imparting the force on the core. Left to itself, the force, therefore, tends to radiate in the direction of the blow. The fan shaped flakes detached in free flaking technique are a good example to demonstrate this point). As a result, pressure flaking technique is quite suitable in the removal of elongated blades. Usually it is used for delicate retouchings but in blade manufacture it is one of the essential steps of fabrication.

3. Compound techniques

One or more of the above methods of primary fabrication of tools can be used to give rise to the combined methods. Here are some of the combined methods described.

Clactonian flaking: Strictly speaking this method is not a combined method but we list it here because it involves a special planning. This is the oldest flaking technique known from the British Lower Palaeolithic. The name is derived from the site Clacton-on-Sea in Essex. These flakes are known from all over Europe during various stages of Palaeolithic culture. These are essentially typified by a characteristic high flake angle and a general absence of secondary retouchings on them.

It is a common experience that to detach a flake from a pebble one has to strike a blow in an inclined manner. The angle of this direction of force with the pebble surface is therefore always less than 90° for obtaining a good sized flake. For removing a second flake from the same surface one requires increasing the angle of the blow. If this process is repeated a stage comes when the blow delivered is at right angles and the core in this case, shatters in several pieces instead of giving a flake. Hence this is known as the **critical**

angle of percussion The Clovis technique characterizes the initiation of simple percussion technique. Here once a flake is removed from one surface, both the surface is used as the striking platform to remove another fresh flake from the opposite surface. As a result, the angle of each Clovisian flake is near or less than 90° .

Levallois technique: This technique is named after a site of this name in the suburbs of Paris. It involves taking a flake of a number of flakes from the core of a nucleus and all around its periphery is a contoured platform for a flake. This prepared core resembles a tortoise shell and therefore is usually referred to as **tortoise core**. A heavy blow is delivered on the top of the shaped surface in such a manner that a flake comes out as a core. The detached flake carries the previous dressing on its dorsal surface. It is, therefore, taken to be a technique where a previous planning and shaping of a flake to be detached is perfected. In other words this marks a technological development in prehistoric techniques which needs to be counted in the assessment of the characteristics of a given industry or culture. For long it has been emphasized that the diagnostic trait for the identification of a Levallois flake is the occurrence of a faceted butt. In reality there are many normal flakes known with faceted butts and also numerous Levallois flakes known without any kind of faceting present at their butts. The only feature which goes to define a Levallois flake is the occurrence of centric directed flake scars on its dorsal surface. Many or some of these dorsal surface flake scars do not have clear points of impact on this flake (that is the flake detached with a portion of the previous dressing from the tortoise core). Thus, most of the points of impact of these scars are retained in the core while the flake detached maintains only the main ends of these scars. Besides this, the detachment of Levallois flake is rarely known to have formed an angle of more than 90° with the axis of the flake scar. Levallois technique can be modified by choosing and shaping special cores and thus producing Levallois points and Levallois blades.

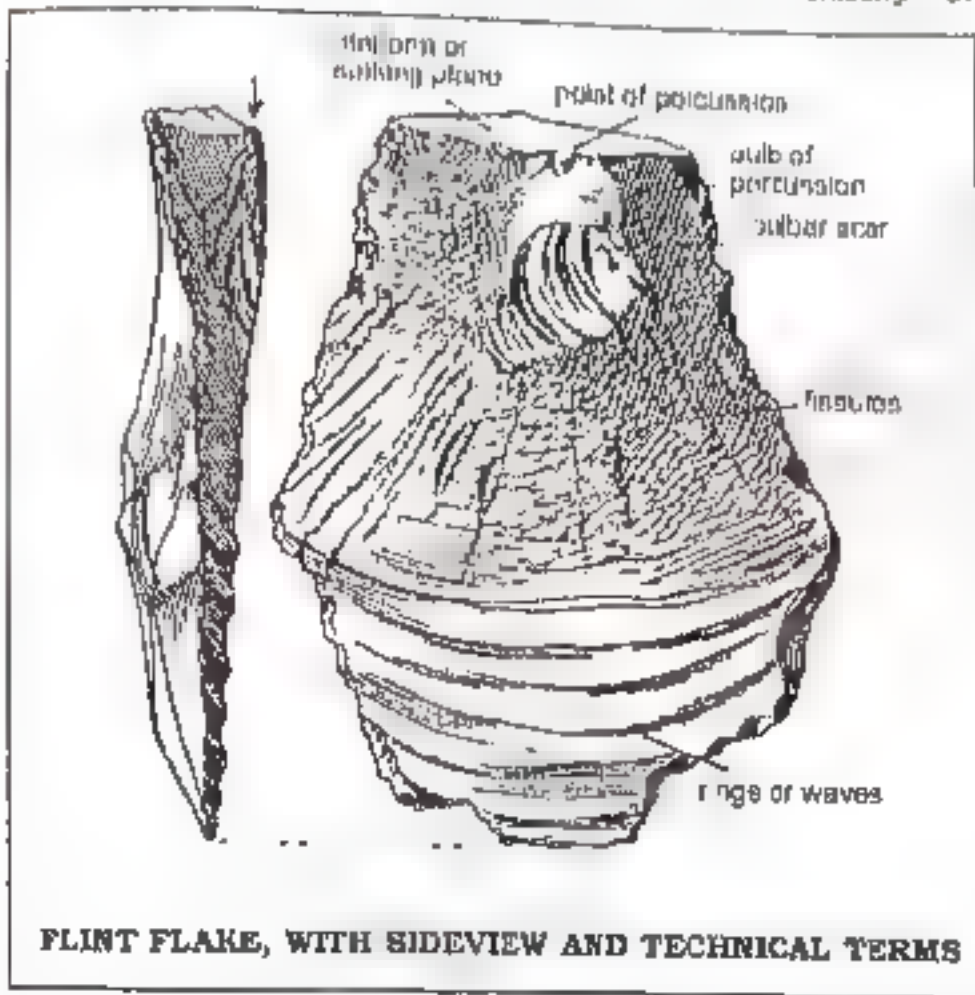
Fluting: The technique of Mesolithic blade production is broadly termed as fluting. This term broadly means the

semi-cylindrical vertical grooves in pillars. And since a fluted core resembles such pillars the technique is termed fluting. The technique involves the preparation of a core as the first step. Here the usual percussion technique is used to transform any nodule or natural pebble into a prismatic shape. A striking platform is prepared at the end of the long axis of this prismatic core. The core is then held firmly on the ground and pressure is delivered from the edge of the striking platform. The pressure can be applied by using a pointed bone antler or even specially prepared wood. In what manner this process was executed will perhaps never be known, but archaeological evidences offer enough proof of a complete perfection of the technique having been mastered by the people, and also that these blades were removed in rapid succession. The main points of distinction between Palaeolithic blades and Mesolithic blades are as follows.

(a) Palaeolithic blades produced by direct or indirect percussion always maintain a pronounced bulb of percussion. The platform is thick and often maintains a slight overhang. Ripples of force are seldom present near the bulb but never any fissures of force along the length of the scar.

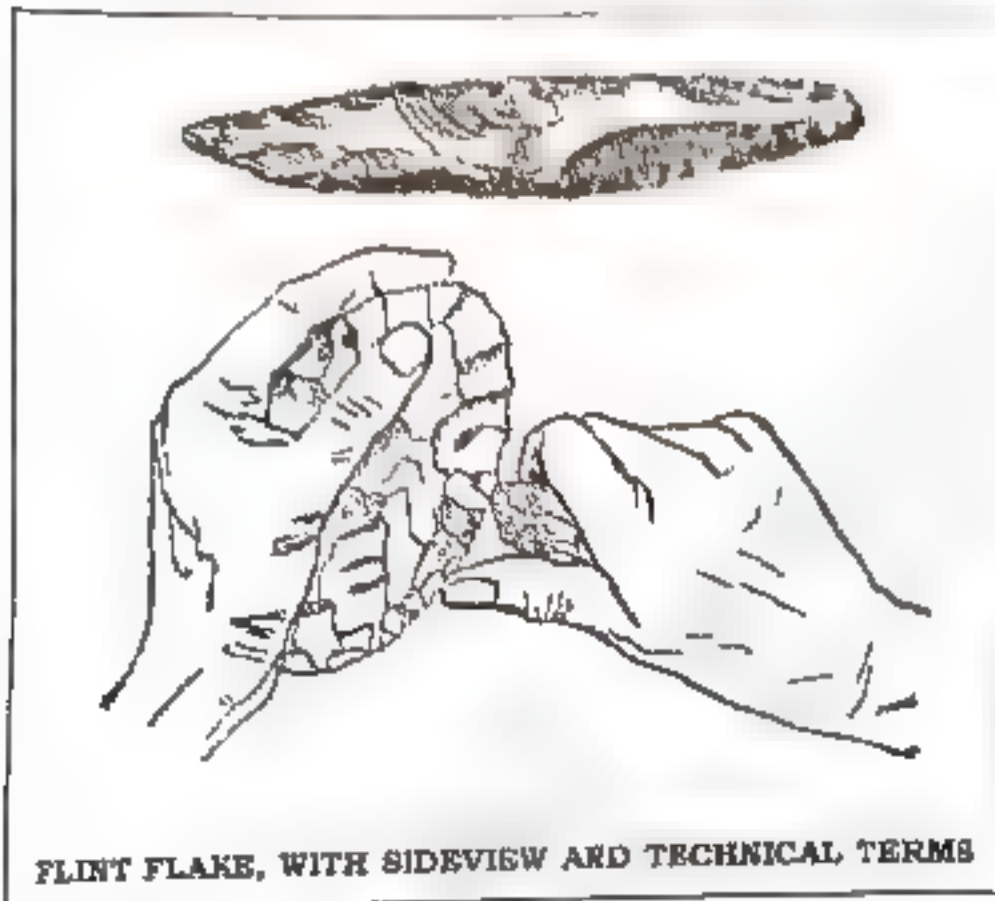
(b) As contrast to the Upper Palaeolithic blades the Mesolithic blades are smaller and produced by pressure flaking technique. Pressure being constantly in touch with the core, the bulb of percussion can never be pronounced. Usually it is as tiny as a pin-head. The platform in these blades need not be thick as the point of impact and direction of the force is totally under control. Finally, often these blades bear numerous ripples and fissures along their scar of detachment.

The identification of the fluting technique can not be mainly based on these features as these are not always true for all kinds of raw materials. Hence the presence of the characteristic fluted cores alone can demonstrate the presence of this technique. In fact for instance, it is demonstrated by actual experiments that pressure flaking can not remove a blade more than 2 cm in length. This has led many authorities to attempt results of pressure flaking



variety by punching technique. Prof Francois Bordes has produced beautiful 'laurel leaves' - sometimes as big as .7 cm - by merely using punching technique. It is, however, true that none of these flake scars (produced by percussion) bears those numerous ripples of force that the original laurel leaves have.

Microliths: The flaking techniques described above may have formed the main basis of tool fabrication for nearly one million years of our prehistoric past. The microlithic technique shares more or less the same features except that the main emphasis in this period shifts to blade manufacture by fluting. These blades are basically different from Palaeolithic flakes in the fundamental feature of having too much built-in sharp borders. Therefore, retouching in this period mainly aims at blunting an already sharp border. Thus, as a technique, was evolved as early as



26 thousand years before the Microlith makers reemployed it. In early Perigordian or Chateauperronian blunting of an available border by steep or abrupt retouchings was first evolved. In entire Upper Palaeolithic this technique survives in various degrees and by the time Mesolithic culture starts it is adopted as the predominant retouching technique. Microliths are found to occur from almost 10 000 B.P. and continue to occur well within Christian era in many countries. These may or may not be found with later cultures (like Neolithic, Chalcolithic etc) as well. These are not used individually as tools. These were mounted in multiple numbers on suitable shafts to be used as tools. Obviously the emphasis has been the lightness of the finished implement and this explains the preference for tiny shapes especially when compared with tools of the earlier cultures.

4. Polishing and Grinding: Stone age implements have all along been flaked and retouched in various techniques to

suit a function. In the last of the stone ages i.e. in Neolithic period an altogether different finishing technique is evolved. This is clearly demonstrative of an altogether new functional adaptation. All available evidences indicate that man had just evolved an agricultural economy and he had to clear a great deal of bushes and trees to obtain open cultivation land. The new technique of grinding and polishing may have been result of this imperative.

To suit this change in the purpose and hence technique the raw material of the Neolithic tools is also changed. Quartzite or flint are no longer found suitable. A much finer grained and harder igneous rock such as dyke basalt, dolerite and epiorite become the most commonly favoured raw material. It would appear quite evident that the Neolithic people not only had gathered wide practical knowledge about various rocks and their properties but had skillfully quarried two or three different varieties of rocks to shape different tools. That is, while chalcedony continued to be used to prepare microliths (to be used as composite tools), dolerite was mined out specially to prepare the heavy axes. Quartzite is also continued to be used but now mainly for making ring-stones or bolas. There are many Neolithic sites where all these varieties of raw materials and techniques occur together.

A stone axe in the Neolithic period is prepared by taking a normal chunk of this special rock and then flaking it with stone hammer to obtain the shape that has been planned. Often the original surfaces of the core are used to advantage in order to decide the shape. The nature of the stone is such that unlike the result of stone hammer technique on quartzite the flaking removes only small and shallow flakes. Once the shape is achieved the intersection of all the scars or any other generalized undulations left on the surface is carefully knocked off with a pointed hammer. This process is called **pecking**. Finally the finished tool is rubbed over a rough stone surface with water thrown in. Usually the working border is ground but in many cases the entire body of the tool can also be ground. Many authorities believe that some kind of fat may have been used during the final rubbing stage in order to give a polish to the finished type.

and hence the name **grinding and polishing**. Many Neolithic occupations have yielded large concave sand stone slabs with marks of deep grooves along the length. These finds further demonstrate the manner of execution of this technique. Using fat to polish, however, seems very unlikely because rubbing is not effective with a film of fat which lessens friction. It is, therefore, quite likely that the actual technique consists of **flaking, pecking and grinding** only. The unusual polish seen in some Neolithic axes may have been developed by prolonged use of these axes.

Ring stones and bolas are the other examples of the use of friction put to maximum advantage by the Neolithic people. These heavy quartzite pieces have been given a smooth shape by skillful pecking and grinding and then a hole has been driven through this by devising a drilling technique. Sometimes these holes can be as big as 8 cms in depth and 8 cms or even more in diameter. It is difficult to imagine how these holes were made unless we entertain the possibility of the use of a special drill with shell or chert stone inlay. That this kind of a drill could not have been operated by bare hands is also likely but to prove the existence of a bow-drill for this stage is also impossible. The holes in these ring-stones have an hour-glass cross section and this can be taken to indicate that the hole was made from both the surfaces in order to meet at the centre.

Preparation of pottery with specially treated clay was another prehistoric innovation seen during the Neolithic period. We shall go into the basic characters of ceramic technology and the subsequently arriving metal technologies along with the description of cultures in the later chapters. Here we shall get to know some of the prehistoric types.

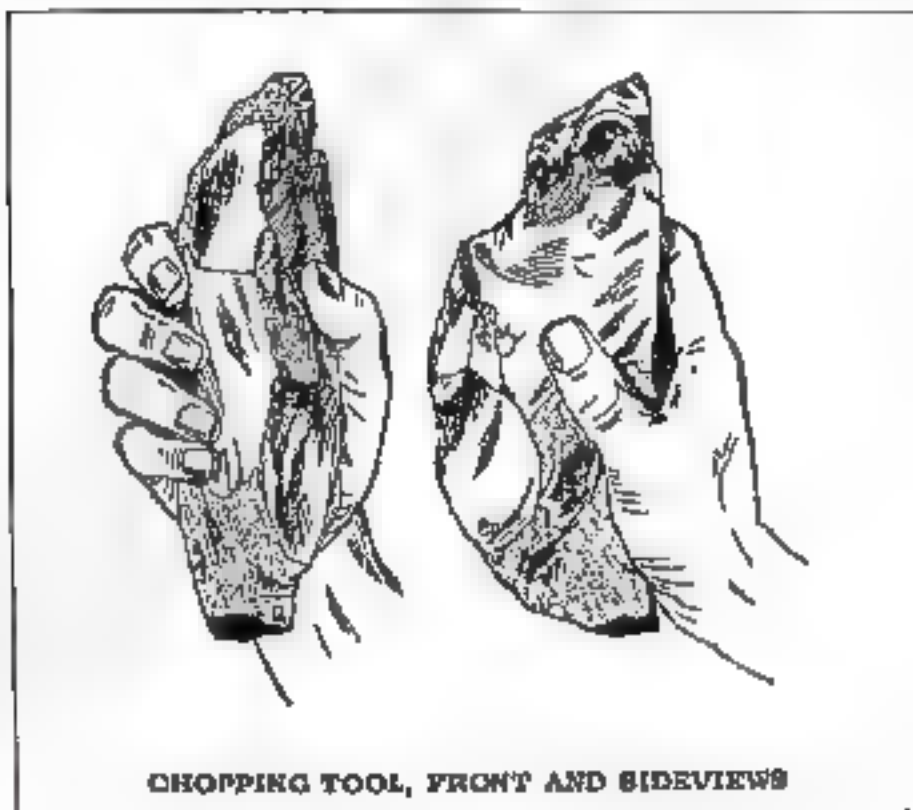
In earlier chapters we have gone at length into the philosophy of types in prehistory. Therefore, it need be specially emphasized that the enunciated types are universal and any local variations observed can always be accommodated as a variant within a generalized definition of one of these types.

5. Palaeolithic Types : Palaeolithic period has been mainly divided into Lower, Middle and Upper on the basis of certain

predominant types. We shall lay down the definition for these types below:

(i) **Chopper:** These are core tools prepared by unifacial flaking of the terminal end. In some rare cases the flaking might extend over one of the surfaces but do not include the butt-end which is as a rule kept untouched. A chopper can have a U shape or even circular appearance and hence the working end can range from a straight and transverse border to almost a semi-circular border. If the two terminals of the working border are joined by a straight line the maximum thickness of a chopper usually falls posterior to this line (towards the butt-end). If, however, the maximum thickness lies anterior to this line it is advisable to consider such a specimen as a flake core.

(ii) **Chopping tool:** It is merely a variation of the chopper with the only exception that here the flaking is done from both the surfaces. That is, the terminal flakings are alternately removed by altering the surface facing the worker. As a result of this the working end of a chopping tool



is jagged or wavy as contrast to the sharp border of a chopper. Here also the shift of the maximum thickness towards the working border can be taken to include them as flake cores.

Both Chopper and Chopping tools are usually prepared by primary flakings alone. These are delivered by stone hammer with a swinging blow or using block on block technique. In some special cases some secondary flakings may also be present. But if over and above primary and secondary flakings there is evidence of continuous retouchings along the border these should be considered as **Core Scrapers**.

(iii) **Handaxe**: It is perhaps one of the earliest tool types identified in prehistory. The main distinguishing feature of this type is that it is extensively retouched on both the faces and hence the name **Biface** is also used for this type. It distinguishes itself from other bifacial implements in the fact that with a few exceptions (e.g. Ovate) it has a thicker and broader end called the butt end and opposite this occurs the narrower and thinner end called the working end, and the two surfaces and the lateral borders are so flaked as to meet at the working end. By implication biface is a core tool, but if all these characters of a biface are satisfied in a given specimen and over and above this a small portion of the **scar of detachment** with its positive bulb of percussion is retained then such a specimen can be easily designated with a prefix qualifying the difference. That is, this specimen should be called a **flake-handaxe**. On the basis of their shapes the handaxes can be classified into a dozen varieties. For instance the elongated types of handaxes include **Lanceolate**, **Micoquian** and **Ficron**. The medium size squat group includes **Triangular**, **Sub-triangular** and **Cordiform**. Similarly ovoid group with rounded working end includes **Amygdaloid**, **Ovoid** and **Limande**. Besides these, there are some other types also identified but these are more or less area specific. Technologically and hence culturally these groups are not always associated. For instance, a lower Acheulian or Abbevillian handaxe can be **Lanceolate** or **Ficron** but seldom a **Cordiform**. Similarly an upper Acheulian can be

Micoquian or Cordiform or Limande without any regard to the size. It is, therefore, important to remember that these categories are morphological with some technological rider alone and it is not safe to consider any of these types as specific for a cultural stage. It may be, therefore, worthwhile to attempt at some cultural terms for the handaxe.

Abbevillian handaxe: These are the largest of all handaxes known in prehistory and often weigh as much as 2-4 lbs. Although bifacially worked these handaxes have scooping deep scars which give rise to very sinuous lateral borders. There are rarely any secondary flakings done along the borders. Usually these specimens are not quite symmetrical.

Acheulian handaxe: These are smaller and more symmetrical in their dorsoventral contour. There are numerous secondary retouchings done and these are mainly concentrated around the lateral borders. Around middle Acheulian period cylinder hammer technique is profusely used to execute the final shaping. In many upper Acheulian handaxes the sharp lateral border continues over the butt-end as well. A special shape of these handaxes is an Ovate which may have a twisted S or Z shaped lateral border.

(iv) **Cleaver:** It is ordinarily a handaxe with a transverse working end. This transverse edge can be obtained by retouching from both the surfaces and also by skillfully designing the intersection of a sloping flat scar with another similar scar or a retouched or original surface on the opposite face. The most common cleavers which come from Africa and India are made on thick medium sized flakes where the ventral surface has a single flake scar of detachment and the dorsal surface has a sloping scar towards the anterior end. Extensive flakings along both the lateral borders and the butt-end attempt to drive a suitable shape. Since this flaking is alternately done, the tool has a characteristic parallelogram cross-section. According to the shape of the butt-end cleavers can be classified as either U or V shaped. The working end, likewise, can be classified as transverse, left-oblique, right-oblique or divergent according to the position and nature of the bit.

Most of these four types of tools discussed here are generally heavy duty multipurpose tools. In their manipulation, a grip involving the palm of the hand is effective.

These are mostly found associated with the earliest group of human culture and hence they are taken as defining what will be called the **Lower Palaeolithic Culture**.

The following eight types including their sub-types and also at times with a mixture of some of the earlier described types define the cultural stage called Middle Palaeolithic. This is a period which is of shortest duration and hence can be truly considered as a period of transition from Lower Palaeolithic to Upper Palaeolithic.

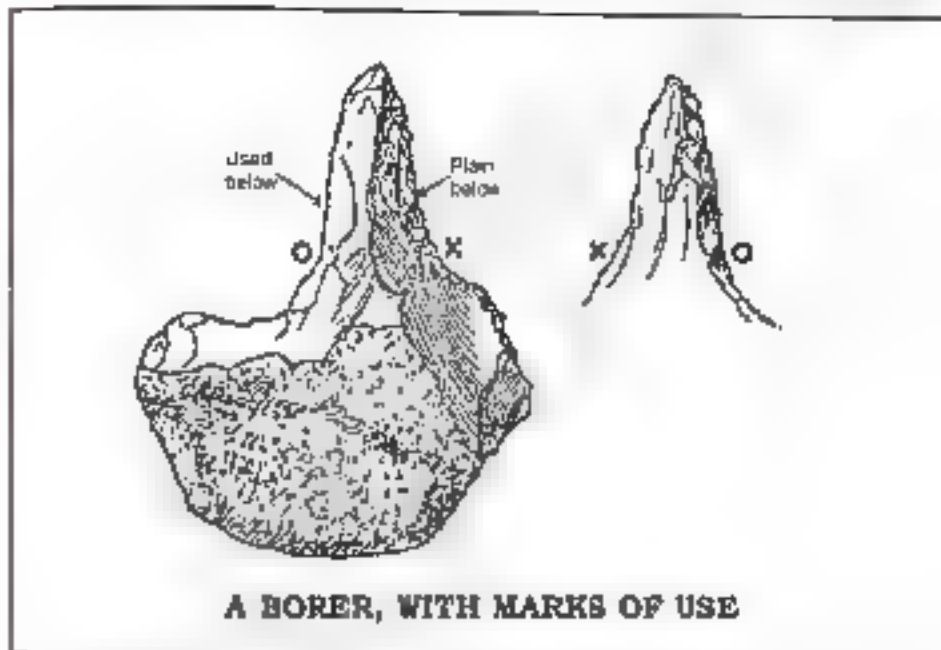
1. Scraper: The actual name of this type is **Side Scraper** but most of the non European writings still use the term singly. That is unless otherwise qualified as **End Scrapers**, **Scraper** will mean a **Side Scraper**. This forms the most common of all flake tools known from the entire Lower to Middle Palaeolithic period. There are as many as 24 sub-types identified within the side scrapers. There are based on slight techno-morphological variations. A side scraper is a flake tool in which one or more lateral borders are shaped by contiguous retouchings. If this retouching is done in fish-scale manner such side scrapers are also referred to as **Quina scrapers** (fish scale is a special manner of retouching in which a series of tiny steps appear as ripples.)

2. End Scraper: This is a tool type in which the scraping border is at the morphological end of the specimen and also the retouchings on the border are steeper than in side scrapers. In Lower and Middle Palaeolithic it occurs in simple form of an end retouched specimen while in Upper Palaeolithic it takes a specific shape. The Upper Palaeolithic end scrapers are prepared on thick blades the terminal ends of which are retouched at a high angle. At least 15 sub-types within this category have been identified.

3. Point: Point in prehistory are often a misunderstood type. There may be many broken flakes or blades which have convenient workable pointed ends (and may indeed, have been used as a point) but such specimens cannot be included into the type **Point** until they show evidence of

deliberate reinforcement on them. These are triangular flakes in which one of the angles is acute and show reinforcement around the apex. In some special cases retouchings may be done along only one border while the other border has a natural fracture. Mousterian point is a very special form of this type known from only some specific areas. The speciality of these points lies in their symmetrical finish with almost all round retouchings.

4. Borer: This is a type which like the end scraper is more of an Upper Palaeolithic character. In Lower and Middle Palaeolithic it occurs in generalized forms. It is a type in which a thick projected end of a flake is specially obtained



by etching out two (ideally) notches at the base. In many cases removing of even one notch can serve the purpose.

5. Backed Knife: This is a Lower and Middle Palaeolithic knife which needs to be differentiated from the Upper Palaeolithic knife blades which are also backed. These are specific flakes which are so removed that they have three surfaces (i.e. in cross-section these tools are triangular) of which two surfaces are transverse and converge to form an elongated sharp border running along the length of the flake. These two surfaces and the border created by them never have any retouchings. The surface opposite the

border may be flaked to form a sort of backing. In many cases even this surface is composed of the natural cortex. That is, it is a tool type of planning and may carry no evidence of any further working on it.

6. Notch and Denticulate: These are two different types named entirely structurally. Although all types are structurally defined but the names used to designate them have remained functional just to keep in conformity with earlier literature. Seen in this regard these types appear both comfortable and also uncomfortable for perception. Comfortable because the name indicated the technomorphology of the specimen. A notch is any specimen with a deliberate lateral incurve while a denticulate is any specimen in which more than one notch is prepared along a border. We feel uncomfortable because unlike a 'Knife' or a 'Scraper' these type names do not appear relevant in our understanding of culture. It is important, therefore, to re-emphasize that types do not attempt to describe a culture. It is this fixed morphological description which helps to identify cultures or culture boundaries from within a complicated spread of activities and their left overs.

7. Foliate or Blattspitzen: Back to types again, this is a thin bifacially worked point which is entirely prepared by controlled percussion technique. These points can be differentiated from the leaf points (*laurel leaf, willow leaf*) in the generalized crudeness of finish in the first place. Secondly, leaf points are prepared by pressure flaking technique in such a manner that the thinning of the body and regularizing the working border are both achieved by the same series of flakes. In Blattspitzen, these are done by separate flakes and hence a large number of tiny step flakings are required in the control of the flakings.

8. Burin. This is again an Upper Palaeolithic type but may be known in atypical forms from as early as late Lower Palaeolithic. Burin can be prepared on a flake, blade or even on a core. The working end is exactly comparable to the same of a screw driver. This 0.5 to 1 cm transverse cutting edge is obtained by the intersection of **two plains** which meet at an **angle**. Hence these are also called **dyhedral angle burins**. The two plains are called burin facets and the

manner of their preparation decides the sub-type of the burin

The types that discriminate the Upper Palaeolithic are all prepared on blades. These blades can be retouched in order to reinforce a border or blunt it in order to obtain desired results. Given below are some of the typical Upper Palaeolithic types and the traditions that these types define.



Aurignacian

1. Retouched Blade: These are moderately broad, thick and long blades retouched in semi-abrupt retouches. The retouchings extend all around the borders including the terminal ends. In a typical Aurignacian blade the retouching is in the manner of fish scale. In some instances two

Notches are made on the centre of the blade along the opposite lateral borders. These blades are termed **Strangled blades**. A common kind of retouching done on a slender and slender blade characterizes Aurignacian industries known around the Correns valley in south west France. These are called **Font Yve points** after the name of a type made by the same valley and their type prepared on a bladelet by semi abrupt retouching is quite common. These are called **Dufour bladelets**. A Dufour bladelet is a slender bladelet of 2-4 cm in length in which one lateral border is retouched from the dorsal surface and the other from the ventral surface. Both these borders have semi abrupt retouchings.

2. Aurignacian burin: This cultural tradition is also characterized by the occurrence of a specific variety of burin. Here one of the facets forming the burin edge is made convex by preparing a notch on the lateral border. This makes the area of the surface lying above the notch weak. Hence any oblique blow delivered on the top traverses a curved path in order to emerge from the weak region. This results in a convex fracture. The other facet which intersects with this plain is simple and vertical. These burins are called **Basque burins**. Another variety of burins quite common in Aurignacian tradition is called the **axial or symmetrical burin**. In French this burin is also referred to as **Bec-de-flute burin**. This is prepared at the distal end of a thick blade in such a way that the burin edge lies symmetrically along the mid-axis of the blade. It is believed that this can be achieved by holding the (would be) working end at the corner of a fixed anvil and then hitting the rear end of the blade. This results in the removal of a vertical **spall** (flakes removed to obtain a burin facet). Thus, the process repeated can produce two such vertical spalls which intersect to form the burin edge.

3. Aurignacian End Scraper: These are end scrapers prepared on thick but small nodules and found in association with blade and scrapers in many west European Aurignacian sites. A medium sized core is taken and a large flake is removed from it to form a flat under surface. Calculated tapping blows are delivered around the periphery of this flat surface to result in a series of flake

score markings at the apex of the pyramidal obverse. The special appearance of these scrapers led them being termed **Carinated end scrapers**. If carinated end scrapers are so designed that the striking and projecting end in the form of a nose, such a type is known as nose end scraper. This is achieved by deriving one or a pair of notches on the side of the working border.

The above three types along with several variations of an **ivory lance point** form the main features of almost all Aurignacians.

Perigordian

1. Blade Knife: In Perigordian industries broad flat blades have been retouched to form several kinds of knives and these by far form the most frequent typology all through this stage and the subsequent cultural traditions. In the initial stages they are few and far between and constitute abrupt retouching of one naturally obtained sharp edge of a broad and flat blade while the opposite border acts as the knife edge. In the later stages they are made on rather thick blades with triangular cross-section in such a way that the blunting is done upto the thick mid rib. As a result these become narrowed in appearance. Further these backed blades show deliberate attempt at deriving a pointed distal end with flat ventral surface retouchings. These latter types, as such, are no longer called knives but points.

Audoubert Knife is one of the earliest of these backed blade types. This is a rather short and broad blade where one border is bunted towards the distal end in a slanted or semi-circular manner to meet the naturally-sharp working edge.

Chattelperronian Knife. Sonnevill-Bordes calls it a knife point, because here the blade is rather elongated and the backing is done completely along one border in such a way that it gently curves down to meet the working edge at the anterior end. Usually even the base of these blades is rounded off by extending the abrupt lateral retouchings.

Gravettian Point: These are thick blades where bold backing along one or both the borders (often from both the surfaces) renders the breadth of the blade to almost half so

that the backed ends meet anteriorly at an acute angle. The ventral surface around the pointed end also shows some flint retouchings done in order to narrow down the thickness of the point.

Shouldered blade tools: (Perigordian to Magdalenian). Many Gravettian points show a single shoulder prepared at the butt end and along the border opposite the backed border. Most of these backed points show minor retouchings on both the borders and the ventral surface of the working end. A typical type under this category is called **Font-Robert Point**. This is a Gravettian point with two shallow notches at the base which gives rise to a rather elongated shoulder and a broad tang.

During the Solutrean tradition similar shouldered points are recorded with shallow pressure flaking retouches. These are prepared on moderately broad blades with triangular cross-section in which the rippled pressure flaking retouches cover one half of the breadth of the blade (usually upto the median ridge) with a single shoulder prepared. These are termed as the **Solutrean plane faced shouldered points**.

Another variety of shouldered points is identified in the Magdalenian period. These are likewise termed **Magdalenian shouldered point**. These are smaller than the Solutrean points and have a shoulder prepared almost at one third distance from the pointed tip. The tang, therefore, is both elongated (almost two third of the total length) and broad.

2. Hamburgian Point. This is a moderately broad blade in which one border is so backed that the anterior half slopes to give rise to a point while the posterior half slopes in a concave fashion to form the tang. Occasionally the backing at the butt-end may be extended a little along the second border as well. This tool type is very common in the north European flat land during late Pleistocene period. It is named after a similar site found near the city of Hamburg in W. Germany.

3. Ahrensburgian Point: The same area during the closing phase of Pleistocene yielded a series of Epi-Palaeolithic

industries of which Ahrensburg is a famous site. Here the points are double shouldered as a rule, (scutes carrying the backing along one sloping border) to from the pointed end.

4. Kostienki Point: This is a type named after an Upper Palaeolithic site by the river Don in European Russia. The tool in ideal form is made on a blade with a convex sharp border (suitable to obtain on bluish flints). The point is derived by backing the opposite border which may be slightly slanting. Flat flakings on both dorsal and ventral surfaces are removed from the pointed and the butt end with an aim to make the point and the butt more effective. A shoulder is etched out by either straight or slightly incurved backing of the same border from around half or more length of the blade.

5. Truncated Blade: This is a tool type which is taken as the type fossil of Perigordian-Vb in France. As the name indicates this is any blade or bladelet the shorter ends of which are blunted with steep and abrupt retouch. In addition to these the lateral borders as well may be given the same blunting treatment.

6. Solutrean Leaf Point: These are exceptionally thin and flat points which show the zenith of stone tool manufacturing technology. Their moderately long and proportionately broad shape coupled with the extreme thinness gives them the appearance of characteristic laurel leaves and hence the name. The surfaces of the tool are covered with shallow and elongated flakings originating from both the borders and meeting along the mid axis. These flakings show a characteristic ripple like appearance which is taken to interpret a very controlled pressure flaking technique having been employed. Prof. Bordes, however, had demonstrated that almost similar effect can be produced (in much lesser time) by the percussion flaking as well. These tools can be double or single points and also can be unifacial as also bifacial. These are found restricted only in the Southern industries from southwest France and some isolated regions of northern Spain.

Laurel Leaf: This by definition is a bifacial leaf point which may be double or single. This type is described only from

Upper Solutrean layers. In some Spanish Solutrean layers the borders of these points are characteristically serrated.

Willow Leaf: This is usually unifacial and occurs a little later than Laurel leaves in France Upper Solutrean. The ventral surface is a flat flake scar which may contain a little flaking at the pointed region to reinforce the sharpness. These points are usually shorter and narrower than average Laurel leaf and are also shouldered in many instances.

Szeletian Leaf point: These are bifacially retouched leaf shaped pieces which by and large lack the fineness of French Solutrean retouchings. Like Central European **Blattsplitten** these also often carry patches of flint original surface though the final shape of these pieces and their relative thickness often compare with the Solutrean leaf points.

6. Mesolithic Types

We have already mentioned that the tools belonging to the Mesolithic period are all prepared on micro-blades produced by fluting technique. These are tools which could not have been used simply by hand. There are some evidences known from Greece, Norway, Sweden and Denmark which demonstrate that these tiny stone specimens were merely elements which in combination were hafted on wooden or bone handles to be finally used as implements. Such finished types as spear heads, arrow heads, sickles, knives, daggers and similar other weapons could be easily planned by using these microbliths in several forms of combinations.

In Indian prehistoric contents, however, most of these microbliths occur without their original composite context except at Mehrgarh. Therefore, the typologies for these are purely structural in description like the earlier periods. To identify a mesolithic type one needs only to specify the area of retouch on the **blade** - the basic tool blank of this period. When a blade has parallel ridges along its dorsal surface its own borders are also as a rule parallel. This kind of blade is called a parallel sided or simply **P S blade**. In contradistinction to these there may be some blades with series of bilateral flakings seen on the dorsal surface. These **flake scars** run horizontally to meet along a ridge. It is

believed that this ridge was specially obtained by these transverse scars in order to guide the edge of a blade to be removed and also to form a suitable bed for blade removal. Such blades, even though they have parallel borders, are called **Crest Guiding blades**. Many other thick but short blades with triangular cross section are known to occur in every microlithic assemblage. These are of no regular shape and are grouped as called **Core trimming blades or Core trimming flakes** depending on their elongation (i.e. $L > 2B$). There is a more or less universally agreed recommendation to designate all blades having length equal to or less than 5 cm and breadth equal to or less than 1.2 cm (i.e. 12 mm), as **bladelets or micro-blades**.

1. Retouched blade: Microlithic blades can be retouched in two different manners. These can be either bold retouchings on thick borders or a variety of microscopic retouchings. These can further be divided into two more varieties. That is to say, retouching a border to reinforce the sharpness in the manner of Aungmyathian blades or retouching abruptly to blunt a border in the manner of Pengordian blades. Therefore at least 4 different kinds of microlithic retouched blades can be identified.

2. Obliquely Blunted blade: It is a specific variety of retouched blade. Here, one of the lateral borders is blunted. The blunting is done in such a manner as to meet the opposite sharp border anteriorly. The blunted border may be smooth and convex or it may be angular. In specifically broad blades this type looks very much like a diminutive Chatteperon knife and hence is also referred to as **Pen knife**. Azilian point of Europe, although quite young (Epi-Palaeolithic), in date is also referred to as **Pen Knife** in European literature. An obliquely blunted microlithic blade is usually much smaller than even these Azilian points.

3. Point: Any blade broken in a triangular manner and then retouched along both the sloping borders to give rise to the point is designated as the type **Point**. Sometimes thick blades or bladelets between 5-6 cm in length are steeply retouched along the borders to give rise to a point at both the anterior as also the posterior end. These double points are termed **Sauveterrean points** after the Mesolithic site

called **Saveterre-La Lemanee** from south France. There is also a diminutive form of Gravettian point made on blades during Mesolithic period and these are termed **Micro-Gravette** points. Instances of points made on microlithic flakes are also known in many areas and these need to be distinguished as **flake-points**.

4. Triangle: These are one of the most beautiful tool types of Mesolithic culture. The type is counted as geometric microlith. These are usually shorter and smaller than points, and have no reinforcement of the point. It has usually one border or/and base which are retouched in this type. Two most characteristic triangles are

(a) Scalene triangle and

(b) Isocetes triangle

When a blade is shaped in the form of a scalene triangle by retouching the two borders that form the obtuse angle the type is called a **scalene triangle**. There are many variations possible within this type. In triangles a, the three borders may also be retouched. When a blade is specially shaped as an isocetes triangle and only the base is retouched (usually), it is termed as an **isocetes triangle**. It is needless to emphasize that there may be many borders retouched in this type as well. These merely serve as variations.

5. Crescent or Lunate: This is prepared by a semi-circular retouching of one of the borders of a blade and as such appears like a segment of a circle. In a typical piece the maximum width lies at the middle of the length of tool. Asymmetrical lunates can merge with the range of variations of scalene triangles.

6. Trapeze: These are trapezoid segments of blades the borders of which are retouched. This is taken as another geometric microlith. Usually more than one border is retouched and in rare cases all the four borders may be retouched.

7. Microburin: Besides normal burins often prepared on fragments of fluted cores, mesolithic industries in many areas, have yielded Microburins. It is a tiny burin prepared on a notch in such a manner that the facet below is in the same plane as the dorsal surface and the notch is in the

under surface. (In normal burins the facets are across the dorso-ventral plane and hence the burin edge is equal to the thickness of the blade)

7. Neolithic Types

One of the most common and almost diagnostic type tool of this period is a ground axe. There can be a large variety of these ground axes and all of these can be clubbed together under the family name of celt. In other words, celts can be defined as simply ground axes. There are at least 3 main types within which the celts can be divided. These are **Axes, Adzes and Chisels**.

Axes are roughly triangular in form with a firm transverse edge. The specimen may be oval to rectangular in cross-section. The working edge is invariably ground and polished. In addition to this many specimens are totally ground and smoothed. Axes can be further sub-divided according to the nature of the butt-end preparation. In many instances butt end may be rectangular without any grinding, in some it may be rounded off while in a third kind the butt may be specially pointed. To distinguish the axes that are biconvex in profile (manually only the profile of the working end)

Adzes are similar to axes in all general features except that these are usually thinner and hence may have been prepared on suitable flakes. The transverse working border is formed by a convex surface meeting a flat undersurface. This leveling can also be done by flat rubbing of one surface of an otherwise thin axe. In profile all adzes are plano-convex in shape.

Chisels are small, narrow, rectangular pieces in which the two broader surfaces slope down to meet at the working end while the smaller surfaces running in place of the two lateral borders remain smooth without any kind of slope. These are usually much longer than the axes or adzes.

Shouldered celts are celts occurring in south-east Asian Neolithic sites only. These can be axes or adzes at the butt end of which sharp rectangular shoulders have been cut-out. The right angled nature of these shoulders led many authorities to believe that metal wires must have been used

to do the cutting and hence these are younger than neolithic age (which by definition is a premetal age). Subsequent experiments seem to have demonstrated that thin slices of bamboo with sand and water can make such cuts in some softer variety of stones. Hence it is quite likely that some of them may represent a Neolithic type.

Besides these basic types almost all Neolithic sites yield a large number of ring stones, saddle and querns, bolas and grooved bolas as well. Since these are mere stone pieces put to different uses they do not involve any specific typotechnological description. It is also important to mention that most of the Neolithic sites also introduce the use of ceramics for the first time. We can go into ceramic technology and types in the following section.

3. Chalcolithic or Ceramic Types

From Chalcolithic to early historic archaeology ceramics form the most predominant left over. It is not surprising, therefore, that the typotechnology of ceramics during this period forms the main tool of analysis. Evidences of structures, ornaments, weapons and many other spheres of activities may also be known but these do not form such a regular feature as to form a unit of typology. Hence ceramics have to stay as the main diagnostic attribute of all Chalcolithic and subsequent cultural stages till proper history came up. Regarding the using of ceramics as diagnostic trait it needs to be emphasized that two different cultures in contemporary Indian villages may be known to use identical ceramic types and such evidences, when known from prehistory, are bound to be grouped as a single culture. That is, our identification is merely at the level of ceramic distributional homogeneity or heterogeneity in the absence of any other cultural attributes. Many ceramic cultures identified in the past, therefore, might have been in reality an agglomeration of different cultural groups having trade supply of ceramics from a single central group. The technique of pottery manufacturing has been studied in detail in the recent past. The techniques identified are represented in terms of clay preparation, process of obtaining the shape, finishing and firing. The typological classification is mainly based on the detailed morphological

features. Like in the stone age, here also there is always an intimate relationship of technique with type.

Technique of manufacture

1. **Clay preparation** is an essential step in processing to prepare a pot. Alluvium of river banks or large lakes is often the most suitable material. Since the nature of the clay deposition in a river depends on the nature of rock and soil through which the river flows many alluvial deposits are not very suitable for the preparation of pots. In such areas even the clay needs special preparation. Usually clays rich in minerals and capable of forming an extremely fine grained homogeneity are the most suitable for giving shapes. Thus the clay used in the making of a pot can be of (a) Well leigated structure b) Coarse grained structure, or at times deliberately mixed with external agencies like husk, powdered stone, sand, grass or hay or similar other material. In this case the clay is identified as (c) Tempered with whatever be the tempering material.

2. **The actual shaping** of a pot can be done by two basic ways. It could be handmade or wheel made. The handmade pots can be either made with coil of clay arrangement or using a mould. The prepared clay can be arranged in a coil to obtain the pot shape and then beaten with a flat wood from outside and absorbing the force on a stone pebble from the inside. This beating releases large amount of clay surface to enable shaping a much bigger pot than the original clay coil. In another method a basket mould or the mould of a broken pot can be used to plaster clay from inside and then lift the finished shape out of the mould. Final finishing does require beating in the same manner as used for the coiled pots. All handmade pots lack the characteristic rows of circular lines noted in the modern pot surfaces.

In wheel made pottery prepared clay is put at the central region of a heavy wheel fixed on a pivoted fulcrum. The wheel is given rotatory motion first and then the mud is slowly pulled with the help of the thumb and the rest of the four fingers manipulating it. The centrifugal force on the mud in rotation helps to create a uniform circular shape. All

wheel made pottery can be identified by observing the fine lines of granular arrangement visible on the surface of the pot. As a rule almost all the wheel made pots can be made very thin and the thickness is uniform over the entire surface. The wheel helps in completing a shape but the rest of the treatments are more time consuming and tedious. Normally the finished pot is further given thorough touch of frequently wetted hands. This enables the small pores on the surface of the pot to be filled in and a generally shining surface appears. This treatment is called **burnishing**. At times a mud and colour mixture is made and the pot is coated with this solution before allowing it to sun dry. This also renders closing all pores on the surface besides coating it with a desired colour. This treatment is called **slipping**. In some specific cases a pot may be first slipped in a light colour and then allowed to sun dry for an hour or so and then again dipped in another darker coloured slip. Again it is allowed to dry for an hour or so. Then lightly scratched designs are executed on the surface in such a manner that the lower slip is exposed on the scratched lines. The design is finally made permanent by firing. This treatment is called **reserved slipping**. A colour wash can be given before or after firing and this forms yet another form of surface treatment.

Any pot surface which has been given no such treatment is usually referred to as matted surface. Often this can be further roughened by sticking wet hands on the surface and then lifting up the hand. Such surfaces are referred to as **rusticated surfaces**.

3. Firing: The final texture of the pot, however, depends a great deal on firing. A smooth and uniform texture can be achieved only when there is an open hearth firing in the presence of uniformly controlled ventilation, a suitable media that burns gradually and a proper piling of the pots to be fired. Uniform supply of air can be maintained by digging out air ducts from the bottom of the furnace. A regulated firing usually turns clay into brick red colour. If the temperature is not high enough it may cause blotchy appearance on the surface and at times even if the surface has uniformly turned red there will always be a core within

the thickness of the clay which will remain gray. It is only in adequately maintained temperature, duration and air circulation that the entire thickness of the clay turns red. We can, thus, distinguish an ill fired pot from a well fired one by looking into the results. There are two specific generic ceramic types known in prehistory which are mainly created by specially devised firing techniques.

(i) **Painted Gray Ware** or PGW are the ceramics which have been fired grey and then painted with black designs. The name chosen is highly misleading and can lead many beginners to think this as a type which is painted with grey colour. The grey color, it is believed, is obtained by firing thin clay pots to as high a temperature as 800°C. Such a high temperature can be achieved only in closed furnace with constant feeding of fuel and oxygen from the bottom.

(ii) **Black-and Red Ware** or BRW is a very interesting variety of ceramics which is caused by a firing technique. These are completely black in the inside and around the rim on the outside. The rest of the outer surface is brick red. The rendering of the entire inside black led many an archaeologist to believe that this is the result of inverted firing in the absence of an adequate supply of oxygen. Chemical studies of the scraped surface, however, show that the black colour (which is not only on the surface but extends half through the thickness - the rest half being red upto the outer surface) is caused by carbon. It is, therefore, concluded that the sun dried pot must have been given a coating of some organic resin, oil or some similar matter, before firing. During firing this organic material on the surface as also the thickness through which it is absorbed, is burnt leaving the carbon free. Some authorities claim that double firing might have been required for this type of surface finish. It is important to note at this juncture that Black-and Red Ware shapes are usually medium to small in size and never include large storage pots. In other words these seem to be only "tablewares" and hence may be given special treatments by the culture using them.

4. Painting and Decorating: A pot may be painted before firing. These paintings are usually more permanent. Subsequent to firing the same painted designs may again be

reinforced with another coat. In rare instances a special glaze may be given after the painting. This glaze is prepared by crushing tamarind seeds and cooking the powder in water. This coating is colourless and when spread on a painted surface protects the paint in case it is done after firing and also renders the surface glossy like glass. Incised decorations are quite common in many prehistoric pots and these need to be done before firing. These may be simple as depressions in a series or even horizontal lines scratched along the neck. Sometimes small lumps of clay are fixed on the surface in order to decorate and these are referred to as **applique bosses**. A special kind of incised decoration appears in many advanced ceramics which is so uniform that it is believed that a pattern has been first engraved on a wooden wheel and then the wheel has been rotated with a moderate pressure on the pot just after it has been taken off the wheel. These decorations are termed **roulette decoration**.

Painted decorations can be so varied that any typological designation of all of them is not possible. Nonetheless we do make distinctions between pure geometric lines, crosses, circles, checker board, diamond etc. from natural depictions of wheat stock, pipal leaf, scorpion, stag, peacock or the like. Seldom are these depictions realistic. There is always a degree of stylization involved in them. The areas covered with decoration, the normal range of depictions in these decorations and the colour used often tend to show a uniformity within a given culture. This has led many authorities to use such terms as "Harappan ware" or "Jorwe ware", or the like. Strictly speaking these usages are unscientific on many accounts. Firstly, all sherds found from Harappa need to be conforming to what is meant generally by Harappan ware. Secondly, such terms soon lead to crystalizing all traits of a culture within the ambit of the predefined ceramics. That is, if we find a few X ceramics within an otherwise Y ceramics assemblage we do not hesitate to conclude a contact between X and Y cultures. A culture by no means can be perceived merely on a predefined ceramic feature. Besides, internal heterogeneity within the culture is completely disregarded in this kind of

ascriptions. Ceramic types or type like categories are attempted on the basis of the above four aspects but these types by no means can be conceived of as finite in number. These are mere aids to conceiving an extremely varied situation through time. Shapes of the pots are often the most helpful indicators of a broad cultural area. To reconstruct the shreds with natural rims are matched against circles with known diameters and the diameter of the pot when unbroken is determined. A straight line equal to the reconstructed diameter is then drawn on a drawing sheet. The shred is held at the end of this line in such a manner that the natural rim faces the line. The contour of the shred in profile is then drawn. On the other end of the coin the same contour is repeated in opposite direction and at once a tentative shape of the pot of which the shred forms a part becomes apparent. These shapes can at the most reveal the feature of the lip, neck and part of the body. The bottom of the pot still remains unknown. For this a separate estimation of the broken bottoms from within the collection needs to be done. Similarly spouts, if any, have to be likewise reconstructed.

Unfortunately unlike stone age analysis no standard expression to describe these features are there in ceramics. We may cite below one of the best attempts on ceramic shapes as an example for a beginner to formulate his own approach. Jim Shaffer (1978) in his analysis of Said Qala Tepe ceramics divided a vessel into 3 zones (i) the lip form, (ii) the base form and (iii) the vessel form. The lip is defined as the area where the exterior and the interior wall surfaces cease to be parallel. This area should be located within 2 cm of the vessel orifice. A suitable classification of various forms of lips can be very important in deciding a ceramic trend.

In the same way there can be several base forms identified. Vessel forms are categorized as **bowls** when their diameters are greater than or equal to their height. Further the maximum diameter in bowls always occurs at the orifice or within 2 cm of the orifice. If the height is less than half the diameter such shapes can be designated as **diabes**. If the vessel has a height which is more than the diameter it is called **Jar**. That is

d > h Bowls

D > h Dishes

1

d < h Jars

There may be Jars with heights more than the diameter but maximum diameter is located in the lower two-third which should be identified as amphorae but in cases where the maximum diameter is located in the lower one-third such jars may be called Beaker/Goblet/small Jars. The profile of the vessel can often be used to add further information on the shape. For instance, a **carinated** vessel refers to a bowl in which the body instead of being convex in profile has a sharp angularity. Similarly bodies can be spherical, goblet like or even cylindrical. A ceramic type, therefore, refers primarily to the shape and decoration but can include fabric and firing as well to indicate the technique.

Under Chalcolithic techniques the most significant innovation had been the knowledge of metal extraction. This not only required the identification of ore and then its preparation for the furnace with the addition of adequate slag before firing but also casting the metal into different required shapes as well. Obviously this was a group activity and demonstrates both the knowledge and organizing of labour and resource for its implementation. The constant need for fuel for the furnaces must have kept a battery of workers constantly engaged in cutting trees, drying them and transporting them while another group must have been busy quarrying the ore, transporting them and preparing them. A culture can take off as a successful Chalcolithic phase only when an adequate demographic structure coupled with an ideological and social structure suited to this group activity is reached. It is not surprising therefore, that terracotta figurines, spindles, bricks, bangles and many other allied cultural materials materialize during this stage of culture. We shall refer students of prehistoric technology at this stage to more specialized works to learn about the techniques of preparation of most of the other cultural materials.



Indian Prehistory (A Prelude)



1. The Geo-climatic regimes

India is perhaps the largest peninsular landmass in the world constituting a single country. It lies between $8^{\circ}4'N$ to $37^{\circ}6'N$ and $68^{\circ}7'E$ to $97^{\circ}25'E$. It runs to nearly 3200 Km along its north-south axis. Its a real coverage is 3,267,500 square kilometers. Prior to 600 million years ago and almost upto 120 million years from today most of its western provinces beyond the Aravallis were under sea. Archaean gneisses and granites formed the main landmass of the subcontinent. The

Aravalli formations, starting to rise around the Pre-Cambrian era (prior to 600 million years), separated the western sea from the Himalayan sea. The Dharwarian group forms the first mixed sediments to cover the original crust of Archaean formations. Around 500 million years ago a humid climatic regime developed and this caused several meters deep calcareous depositions. The Cuddapah formation corresponds to this period. The Vindhyan basin was also uplifted during this phase. This was followed by extensive glacio-fluvial deposits from a southern source, not so far specifically identified. These deposits are named as **Gondwana** formations. During the middle of the Mesozoic period around 200 million years ago, the continent got separated from Africa, Australia and South America. Subsequent to this, one of the greatest volcanic eruptions took place in the Pacific and most of the earlier deposits were deeply buried under volcanic lava in most parts of the peninsular region. The rise of the Himalayas and along with this the entire area west of Aravallis was exposed creating a huge landmass that constitutes western Rajasthan and parts of Pakistan today. It was much later during late Quaternary i.e. less than one million years ago that the Ganga-Jamuna trough along with numerous water courses of Himalayan origin started filling up the sub-Himalayan depression. When man evolved, India had acquired its present shape although most of its water courses were still not flowing in a permanent bed. By late Lower Pleistocene and early Middle Pleistocene, India emerged as a country capped by Himalayan ranges in the north along with the chain of Patkai and the Buleman ranges forming two arms in the east and the west respectively, and the Western and the Eastern Ghats running along the two borders of its peninsular extension.

This brief and oversimplified account of the geological history of the country is the backdrop against which a workable chronology of this region has to be developed. Active geological events have taken place even after Pleistocene depositions and have made this job of working out a chronology for this country very challenging. Most of the archaeological interpretations besides working out

chronologists, depend heavily on climatic interpretations and this is often made possible by comparisons with the present climate of the region. The various climatic regions within which India is broadly divided can, therefore, be briefly described here as follows:

A. Moist Tropical Forests: Moist tropical forests are a variety of eco-niche which has been identified in a varied dispersed spread over several regions of the country. Some of the variations, as such, will be more meaningful for our understanding.

1. Tropical wet evergreen: This is an ecological regime which occurs at varied altitudes with a yearly rainfall exceeding 250 cm. In Assam this occurs upto 1070 meters while on the western coast the wet evergreen forest is maintained upto 1370 meter altitude. These are forests with multiple canopies and very rich undergrowth. The plants usually found in this climate are *Dipterocarps*, *Shorea* and *Hopea*.

2. Tropical moist semi-evergreen: This climate regime is mostly confined to the western ghats although some specific regions of Assam, Bengal and Orissa may also be included in this group. Here the annual rainfall varies between 200-250 cm. The main floral character is provided by the *Engenia cinnamomum*. A lush undergrowth is also invariably present.

3. Deciduous: Moist deciduous forests are generally restricted to the peninsular upland between the western and the eastern ghats. Sal (*Shorea robusta*) and Teak (*Tectona grandis*) constitute the most characteristic species of this zone. Rainfall for this zone can be extremely varied, and depends largely on whether one is nearer to the ghats or in the inland region. It can vary from almost 200 cm near the ghats to less than 100 cm inland.

B. Dry Tropical Forests: Dry tropical species abound in areas where the annual rainfall does not exceed 100 cm. The Himalayan foot-hills, Satpuras, Malikals, the eastern slopes of the Aravallis and the inner slopes of the ghats provide this climatic zone. The floral variety is usually stunted and may contain berries, Date palms (*Phoenix*

sylvestris) abound besides some sprinkling of larger deciduous trees depending on local rainfall and soil conditions. There is a strong likelihood that most of the present day dry tropical forest areas must have maintained deciduous forests during the Pleistocene. The increasing aridity off Holocene with the ever-increasing human interference in the recent years has pushed this climatic regime to almost the entire inland areas along the tropic of cancer.

Besides these four main climatic regimes, India maintains a typical desert region to the west of the Aravallis which receives less than 25 cm rain fall per annum. At high altitudes, several special and characteristic eco-regimes seem to develop along the Himalayas. Finally the biggest drainage of the Ganga-Jamuna trough develops its own climatic regime based on the extremes of the seasons and the monsoon.

Much of the identified eco-zones are fast changing because of a combination of several factors but the occurrence of such species as Rhinoceros within the sand dunes of northern Gujrat and Hippopotamus from almost all river deposits in both central and western Indian only indicate that the tropical wet evergreen forest which is found today in areas of more than 250 cm annual rain fall must have covered most of the coastal regions of India during the early and mid Pleistocene. Human colonization of these areas would, therefore, seem not very likely. It is only in the other two varieties, i.e. tropical moist semi-evergreen and deciduous forest regions that human occupations must have occurred. The amount of human cultural debris found from the heart of the desert, in both, the Indian and Pakistan part of it, also tends to indicate that much of the northern part of the desert had maintained a dry tropical forest, if not actually a deciduous forest regime, in certain places. Climatic reconstruction of the desert, in recent years, has attracted so much attention from the experts that one can almost reconstruct the climatic fluctuations of the area with accurate dates for at least the last 20,000 years. For the rest of the Pleistocene, however, it has to be based on such chance finds of faunal remains as the

rhinoceros shoulder blade from Mehiana district, Gujarat.

2. The History of Development of Archaeology in India

Col. Meadows Tylor of the early nineteenth century was one of the earliest to show interest in the archaeology of India. His interest, however, remained more concentrated on the south Indian **Megaliths**. Alexander Cunningham in 1861 and Robert Bruce Foote in 1863 began their explorations and recording of prehistoric antiquities of the country in the subsequent period. While the former concentrated on the historic period and that too of the northern regions of India, the latter was more extensive in his interest extended to even the earliest stone age period. In fact the credit for reporting the first Palaeolithic tools from India is also given to Robert Bruce Foote. The spectacular discovery of Harappa and Mohenjodaro during the early twenties of this century brought about a great deal of interest in Indian archaeology among the scholars. In 1930 Burkitt reported on Cammado's stone age tools collected from lower Krishna valley and also attempted to create a climatic succession for 'Indian Pleistocene' period on Richardson's line of what has been attempted in early African prehistory. De Terra and Paterson in 1939 published their detailed geological study of the Potwar region in Punjab and also described the tools associated with the identified climatic succession. Almost in the same year Michael Todd reported an Upper Palaeolithic in stratigraphic context from Khandwa near Bombay.

In the strictly chronological sense, one can see that the rise and development of interest in Indian archaeology follows almost parallel with the same in France and England. In 1861 the Archaeological Survey of India was established and this was broadly the period when in Denmark the Prehistoric Museum was being established by organizing amateurs. A.C. Carlyle discovered microliths in the rock shelters in Mirzapur along with Mesolithic cage paintings during 1863-1885. In European prehistory Gabriel de Mortillet was still to come out with the names of various traditions of the Palaeolithic period, and the real antiquity of some rock paintings discovered in Spain and France was still being disputed at this time. India, in this

series, has seen many firsts in the history of development of Euro-Asiatic archaeology

A proper synthesis of retrieved fragments of the past was not attempted till 1950 when Stuart Piggott brought out the book *Prehistoric India*. Of course, works of Panchanan Mitra on the same lines preceded Piggott's by a couple of decades but the amount of material discovered till his time was too rudimentary to form a complete picture. Researches in Archaeology of India for the period between 1861 to 1944 can be best compared with a stamp collection and had not formulated any theoretical paradigm (Kuhn, 1970 calls it the Pre-Paradigm-stage). It was only in 1944 that Sir Mortimer Wheeler started baptising a series of Indian archaeologists into what Dhavalikar (1984) calls the 'time-space' perspective, the archaeologists in India could now collect their 'stamps' without damaging the corners and also learn the method of arranging them within a given 'album'. This could be achieved by adhering to type excavating technique evolved by Mortimer Wheeler and developing vertical sequencing of excavated material. The baptism could not, however, be carried on for a long period. By 1948 Wheeler left the country. But the missionary zeal of the new converts, no matter how few they were, was enough to develop a distinct variety of archaeologists in India to whom the time-space frame was the only goal an archaeologist was supposed to serve.

In 1961, the first international conference of Asian archaeology was organized by the Archaeological Survey of India to mark the occasion of their completing one hundred years of existence. The deliberations of this conference at many points, brought Indian archaeologists face to face with anthropology but the total pre-occupation of the former with pot sherds, stone tools or megaliths on the one hand and with terraces, layers and phases on the other, made them totally ignore the cultural logic of the renowned anthropologists. From then onwards there has been no looking back. Archaeology in India has progressively moved away from anthropology. Any criticism of our inadequate chronology has been adequately met with by delving deeper and deeper in our vertical trenches. Inevitable requirement

of natural and biological sciences to perfect our time sequence is being emphasized. The *Joint Institute of Fundamental Research* was established in 1961 and a plethora of archaeological data started appearing from a few Chalcolithic sites. In 1961, Devan Chandra, Pune for the first time attempted to bring together all the information gathered till then in Indian Archaeology. Almost in the same year (1961) D.D. Kosambi brought out *The Culture and Civilization of Ancient India in Historical Outline*. The book became an instant success in sociology, history and linguistics. It aims at the reconstruction of Indian civilization as a dynamic process with the help of archaeological, textual and mythological basis wherever and whichever is available. In Indian archaeology this book did not even create a ripple. To most of the archaeologists, its approach was as ridiculous as looking through the wrong end of the telescope. Subbarao's *The Personality of India* (1958) made a much bigger impact than Kosambi's work could. This was primarily because Subbarao's approach was purely anthropogeographic and also such an approach has a common-sense level attraction as well. The establishment of a special journal for archaeology *Puravartta*, in 1967 shows that by this time a marked increase in the number of scholars involved in archaeological research must have occurred. University departments, museums and research institutes were generating fresh data from all over the country. A look through the contents of the early issues of this Journal can at once explain the generalized trend set for archaeological researches in India. The questions asked and dealt with are by no means unimportant, but nothing can be further from anthropology than these researches.

Archaeology in the United States during his period was passing through a series of reformations and rethinking. While Binford brought out his '*Archaeological Systematics and the Study of Culture Process*', in 1965, Chang (1963) appealed for more studies in settlement archaeology. In 1967 Deetz gave an '*Invitation to Archaeology*' for looking beyond material culture. Orme (1972) came out almost openly to recommend anthropological models for culture studies. Allen and Richardson (1971) went way ahead of all

by even recommending methods of reconstructing kinship from archaeological data. As this was so bewildering for the conservative school of archaeologists that Jacquetta Hawkes (1968) could not help but bring out her apprehensions in print. The only Indian to have reacted to Hawkes was D.P. Agarwal (1970). The latter goes all the way to support the changes in archaeology where, increasingly, natural and biological sciences are being used. Surprisingly he does not comment on the need of these objectivized environmental data for serving the new paradigm that archaeology was adopting in the west. Another Indian scholar after a short stay in California came back and wrote a book to emphasise the very important cause anthropology can serve in Indian archaeology (Mallik, 1968). Again this solitary attempt to weld the two branches could not bring the desired change because of its rather sharp criticism of the existing school and theoretically weak arguments for anthropology.

It is evident that the preoccupation in India was increasingly getting tangled in environmental archaeology and the reasons for this are fairly evident. In the first place India had always suffered from the lack of a scientifically demonstrative chronological framework. This, in the face of a Wheelerian obsession for constructing sequence, gave birth to a distinct chip on their shoulder. In the second place, a large number of the new generation archaeologists in USA started reviving ecology as a dominant factor in moulding human culture (Flannery, 1972). The seminar on *Radiocarbon and Indian Archaeology* (Ghosh and Agrawal, 1972) plainly shows the effects of these developments in Indian archaeology. A combined thrust of newer demands of environmental studies in archaeology on the one hand and the need to classify the enormous amount of data within an environmental frame on the other, must have caused the emergence of the *Indian Society for Prehistoric and Quaternary Studies* in 1977. The first volume of the organ of this society named *Man and Environment* appeared the same year. Sankharya's updating work of *Prehistory and Protohistory of India and Pakistan* (1974) incorporates a considerable amount of the new body of data from the Middle East including the remarkable evidence from Mehrgarh but discussion of culture-process is kept to the

minimum. In 1978 Airbus, Goudie and Hegde brought out *The Prehistory and Protohistory of the Great Indian Desert*. Allchin and Chakravarti's *A Source book of Indian Archaeology* (1979) surprisingly does not even raise the issues which are relevant in any historical summary. There are some others like Pan's *Prehistoric Uttar Pradesh* (1982) or Jaiswal's *Chopper-Chopping Component of Palaeolithic India* (1982) but these address themselves to fragmented areas or features. Agrawal's latest book called *The Archaeology of India* (1982) attempts to summarize all the archaeological material of past researches apparently within a historical framework. There is no theory in this book, not even broad generalizations. He does fall back on anthropology but only so far as the selection of chapter headings go, e.g., 'The first farming cultures'. But he demotivates all hopes for anthropological archaeology when in the 7th line after opening the chapter on Prehistoric Art he writes, *Possibly he [the Mesolithic man] did not even believe in anything beyond the material. There were no gods, religion or after-life* (page 77, italics mine). One wonders whether Agrawal is describing the capitalistic western world of today!

Finally I shall like to briefly refer to the impact of **New Archaeology** of what Dhavalikar would like to call 'Bin Clarke' revolution in Indian archaeology. Sankalia himself chose this topic for the D N Majumdar memorial lecture in 1974 (Sankalia, 1977). The very fact that he chose to examine New Archaeology in a very pointed fashion, should have made some impact on Indian archaeologists, but apparently they had no time for theory when they were busy with classifying 'pots and pans' or 'stones and bones' coming out of their on-going excavations. The only reverberation of this was felt in 1985 when Deccan College organized a seminar on *Recent Advances in Indian Archaeology*. The proceedings report is edited by Deo and Paddayya (1985). Paddayya goes all out to initiate the Indian archaeologists to the concept and methods of processual archaeology - but alas what follows is the same stuff - although carrying such ambitious and misleading captions as 'Cultural Ecology, of Early Man in India' or 'Cultural Ecology of the Neolithic India.'

The above discussion will clearly demonstrate that Indian archaeology still remains in what may be described as a "descriptive stage". An analytical stage in archaeology can not emerge without a sound theoretical foundation for the structure of culture or culture change. Such a change seems a very remote likelihood without developing anthropological archaeology in India. Archaeology in our country has its umbilical cord tied to history and this kind of archaeology cannot help us much in understanding such a complex country as India.

3. Towards a Regional Perspective

Earlier we have seen the how and the why of the existence of diverse climatic regimes in India. While most of the peninsular region remains essentially tropical the rest of the country is governed by a number of seasons of which Summer Monsoon and Winter are the dominant ones. The Himalayas, covering almost the entire northern Boundary, and its two axial chains, viz, Sulaiman in the west and Patkai in the east, forms a fairly good barrier for the country from the Siberian cold winds. The height of the Himalayas being almost of the same level as the westerly currents, a predictable monsoon for the country is almost assured by the giant mountain maintaining the line of **Inter-Tropical Discontinuity** constantly to the south of the mountains.

It is a common experience for anybody who visits India to see this diversity and almost accept this landmass as a conglomerate of several curiously 'different worlds' which are merely wrapped up together with a common history. It will not be quite logical, therefore, to conceive India as forming distinct culture areas with almost insular boundaries. Subbarao (1958) had already attempted this using the then available archaeological data. He could quite successfully demonstrate 'areas of attraction', 'areas of relative isolation', 'areas penetrated recently' and the like. It is not surprising that all the large river valleys like Indus, Ganges, Godavari and Krishna have been shown as areas of attraction or 'nuclear zones'. Obviously the perspective chosen is from the standpoint of early cultivators. Most of Narmada, Son and Mahanadi or Burhabalang in this sense have been

considered as areas of isolation in the light of the Neolithic sites known till then. Today we have Neolithic near Narmada and Kuchai near Barchaba and both demonstrative of a farming community settlement. But what has been counted as nuclear zone may not have been really an area of that big an attraction for early human gathers. In fact we have reasons to believe that the rocky or hilly areas maintaining deciduous forests with less than 200 cm annual rainfall may have been the most likely areas of attraction for the Lower Palaeolithic populations. One of the richest caches of Palaeolithic concentration in India lies in the area which includes Narmada to the west, Chhotanagpur, northern Andhra and the Vindhya segment of Uttar Pradesh. Areas of Palaeolithic occurrence outside this region are basically different in their character, and in great likelihood, also in origin. The adaptations chosen in these extra nuclear zones for Palaeoliths and hence also their cultures are bound to be quite different from the majority already found. Thus, although the very character of India would seem to tempt one to a regional approach, yet such an approach may temporally be a failure.

4. Pleistocene Chronology

No study was specifically undertaken in India to construct a Pleistocene chronology applicable to the whole country till 1935 when the Yale-Cambridge expedition arrived. The detailed study of the Kashmir and Potwar region, by the team led by De Terra and Paterson, helped to extend the already identified Siwalik succession into Pleistocene. De Terra and Paterson demonstrated a series of degradation and aggradation in the river Sohan near Rawalpindi and argued that the Potwar lake was forming during the entire Lower Pleistocene. During the early Middle Pleistocene the lake got filled and drained out because of the tilting of the land and over this lacustrine deposit, the river Sohan started flowing - thus depositing the freshly brought glacio-fluvial material on top of it. They could also demonstrate that the Villafranchian horse *Equus hyasudactus* which was found in direct association with the first Himalayan glaciation at Malabarhagh Karewa in Kashmir was also found in Tattot

the penultimate deposition of the lake. Thus, all the other subsequent geological events could be conveniently arranged within the fourfold Alpine glaciation scheme.

The following details put it in still a simpler manner

1 Northwest Punjab or Potwar was demonstrated by early geologists working there as being formed through the building of seven lacustrine units. These geologists named the deposits and gave them tentative Quarternary names on the basis of comparable faunal groups identified in them. These deposits together were termed as **Siwalik succession**, with three sub-divisions, shown for convenience.

III.	Upper	7. Pinjaur	1st Himalayan Int. Gl.
	SIWALIK	6. Tatrot	1st Himalayan Gl.
II.	Middle	5. Dhok Pathan	Upper Pliocene
	SIWALIK	4. Nagn	Middle Pliocene
I.	Lower	3. Chunj.	Lower Pliocene
	SIWALIK	2. Kamhal	Upper Miocene
		1. Murce	

De Terra and Paterson could first demonstrate that the Tertiary fauna ends with Dhok Pathan and, secondly, in Pinjaur occurs the first Villafranchian fauna which, in a contiguous region in Kashmir, is also found directly associated with the episode of the 1st Himalayan glaciation.

2. The entire succession in the rest of the Pleistocene period is recorded in the form of a series of terraces caused by a number of earthquakes. The deposits which were older and once formed the surface of the terrain, thus, got pushed up and the river Sohan cut a bed in the lower level to deposit its new, and hence younger, material there. These terraces are named by their position from the top. The original bed which marks the first descent of the river is called T_D and is composed of huge boulders found almost in the form of a conglomerate. This bed is now shifted to almost 147

meters above the present course of the river. Between this first episode and the present level of the river there are five more terraces and they are named serially. De Terra could demonstrate these with the succession of Pleistocene climatic episodes. Thus, if Tatrot represented the first glaciation, Pinjaur must be co-eval with first interglaciation. T_D - IInd Glaciation, T_1 - II Interglaciation and so on, as shown below.

Holocene		T_5	Modern Soil
P	Upper	T_4	IVth
L			Glaciation
E		T_3	Interglaciation
I	Middle	T_2	IIIrd
S			Glaciation
T		T_1	Interglacial
O	Lower	T_D	IInd
C			Glaciation
E		Pinjaur	Interglacial
N		Tatrot	Villafranchian Ist
E			Glaciation

Although this was a mere transplantation of European chronometric model to India, one can not deny that as a pioneering work De Terra and Paterson's geological study in Punjab and Kashmir provided Indian archaeologists with a firm time-frame for the first time on fairly logical grounds. De Terra and Paterson realized that they are dealing with essentially a tropical country and hence a chronology tied down with glacial events cannot be applicable to the whole country. It is perhaps with this idea that they surveyed the Narmada and identified parallel alluvial deposits for all the six terraces of Punjab. They argued that Narmada was not born during the Lower Pleistocene stage (comparable to

Tatrot and Pinjaur in Potwar). Excessive leaching of the base rock occurred during this period and caused the formation of a specific eroded rock type called **laterites**. Thus, corresponding to Tatrot they identified a fine film of homogeneous clay called **mottled clay** which is laid down by the meandering water flow.

That this chronology was not applicable to quite a number of specific instances, is clear from the fact that no sooner Mortimer Wheeler took up the helm of the Archaeological Survey of India he invited Fredrick Zeuner, a Quarternary geologist at London School, to India to provide a Pleistocene chronology for India. The first Gujarat Archaeological Expedition was thus undertaken in 1944 with Zeuner and Sankalia as the main experts. The team surveyed almost all the rivers in Gujarat and demonstrated that most of these recorded only two gravel beds. That is, unlike the five Pleistocene deposits demonstrated at Potwar and Narmada, only two wet phases are seen in other rivers. In other words, the oldest deposit in these rivers has to be accepted as belonging to the third glacial phase of the temperate chronology. Since then several discoveries in many areas have grossly changed the Pleistocene chronology established in the forties. We shall briefly look into these evidences before finally modifying the available chronometer.

1. A third gravel was identified at Belan in UP. It had not only yielded different cultural material than the preceding gravel but also provided a C-14 date of 23840±830 B.C.
2. The oldest C-14 date recorded from the second gravel at Musa Dam is > 39000 B.C. (Dattawadi)
3. In a recent restudy of the Himalayan geology it was found that a thick moraine descended up to Potwar around 1.9 million years ago. Apparently this conglomerate had been identified as the T₀ terrace by De Terra and Paterson.
4. Near Saurashtra a single Lower Palaeolith was found buried under a micolite deposit which could be indirectly dated to 120,000 B.P. Thus, the Palaeolith could apparently be dated from earlier than 120,000 B.P. All these evidences put together would seem to indicate that taking the whole

of India together the broad period of occurrence of the three conventional stages of Palaeolithic past are as follows:

Lower Palaeolithic Culture	4 million year in Punjab to 39,000 B.C. in the Deccan
Middle Palaeolithic Culture	39,000 B.C. to 23,000 B.C.
Upper Palaeolithic Culture	23,000 B.C. to 0.000 B.C.

Posselt (1975), who had critically examined the faunal and tool typological features of the sites known till then, felt that "The entrance of man into the sub-continent as it has been documented so far, was comparatively late, being in the third interglacial or Upper Pleistocene" (p. 383). It would seem, in the light of the above evidences, that he may be correct for some parts of India but surely the antecedents of man in this country can be pushed so well within Middle Pleistocene in some other parts, specially in the valleys of the north western region of India. The finding of the *Homo erectus* from Narmada would also indicate a greater antiquity of man's presence in this zone than what the faunal and geological evidences would indicate. This is on the assumption that an archaic *erectus* has to be pre-existing in this area in order to give rise to the advanced form discovered there. For most of the other evidences of what we call as Acheulean from India, Posselt may be broadly correct. Acheulean in India must have flourished between 100,000 to as late as 50,000 years before present. This is a time bracket in which most of Europe (excluding perhaps only the Mousterian zone in south west France), continues with a well developed upper Acheulean form. In Africa as well, the Acheulean continues till this date at many sites.



Lower Palaeolithic or Early Stonr Age

As pointed out earlier, this cultural stage in India can neither be conceived of as chronologically homogeneous nor can one think of the cultural phase as uniformly occurring all over the country. In different parts of the sub-continent different zones/trends of this culture occur at different times. One of the earliest methodical investigations of Palaeolithic culture (to be held still) remains the study conducted in Potwar by the Yale-Cambridge expedition under the leadership of H De Terra and Paterson.

1. *Sohian*

Between the river Indus and Jhelum a stretch of nearly 100 km is bordered by four discontinuous mountain ranges. These are the Himalayas to the north, the Salt ranges in the south, the Punjab to the west and an extension of the Siwaliks in the east. This raised plateau is named **Potwar**. Rawalpindi lies almost in the centre of this plateau. The entire plateau is composed of almost 25,000 feet (approx 7,600 meters) thick Tertiary sediments almost entirely of lake origin. We have already mentioned the top six layers of this huge deposition which are normally referred to as 'Siwalik divisions'. The river *Sohian* or *Sonu* (*Sobhana* in Sanskrit) started flowing on this plateau in the Pleistocene period when the trough was almost filled up and there was no lake in existence any more. There were periodic earthquakes and the region was technically very unstable and, under these circumstances, the older beds of the river often got pushed upwards and the river had to form a new bed and follow a new course at a lower level. The process having repeated itself on a number of occasions, a terrace-like feature is exposed on both the banks of the river. De Terra and Paterson brilliantly correlated the entire geo-morphological process with the advance and retreat of the Himalayan glaciation. Thus, in an indirect way the Alpine chronology could be imported by them to India. Since a large number of Palaeoliths could also be collected by them, a cultural succession of a kind hitherto unknown for India could be established. We shall briefly go into this study in the following pages.

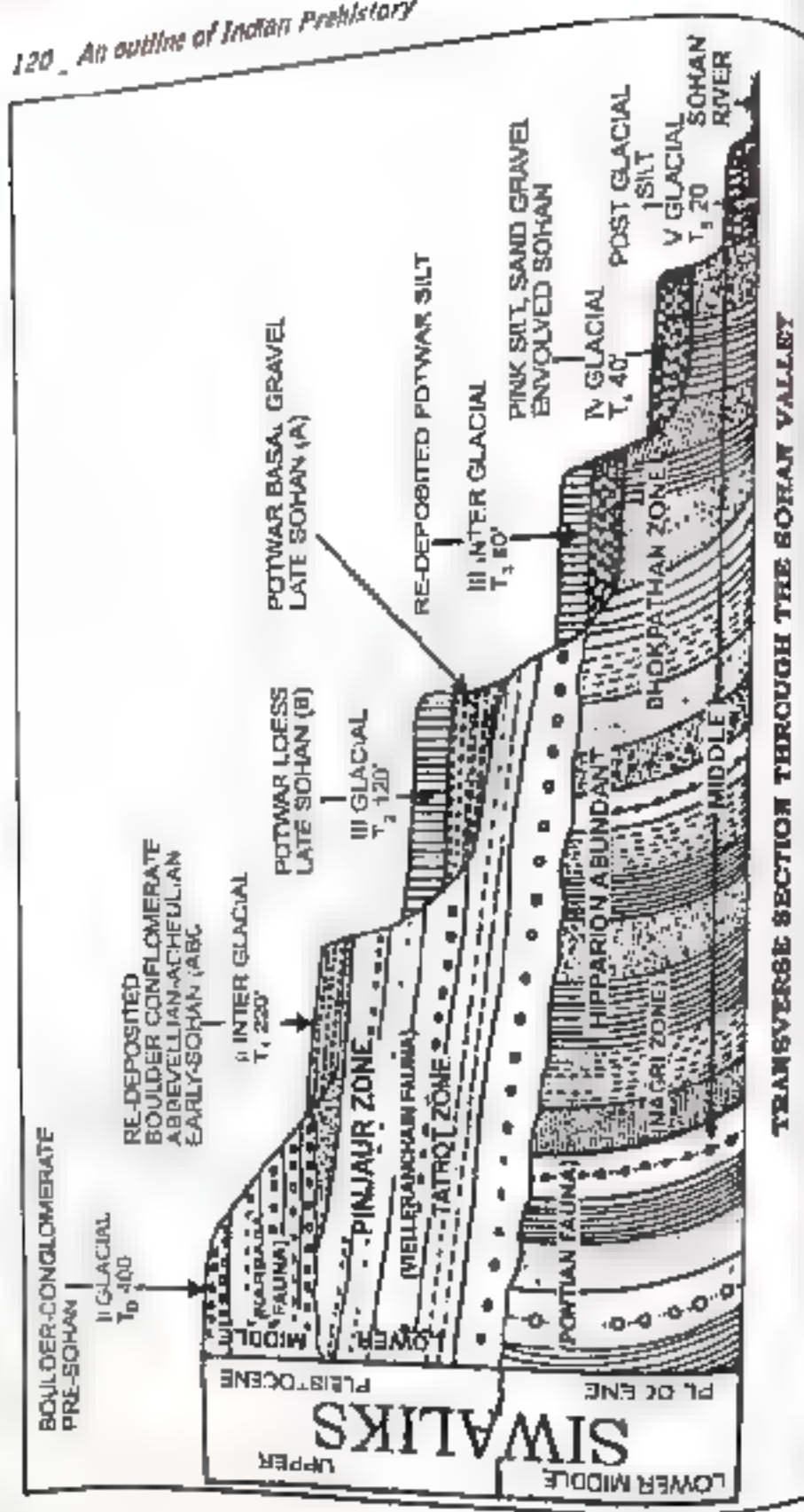
De Terra and Paterson explored the region around Potwar and the valley of Kashmir. Several types of moraine debris, locally called 'Karewas' were identified in the vicinity of the Dal lake by these experts. It was demonstrated that the Karewas at a place called *Malshahbagh* in Kashmir record the earliest Himalayan glaciation. In comparison the Tatrot deposits, although not formed by glacial effect, were found to have remarkable petrological and also fauna similarity with the *Malshahbagh Karewas*. This led them to ascribe the Tatrot zone in Potwar as belonging to the first Himalayan glaciation. Further, upto *Dholpathan* the fauna in Potwar did not contain *Elephas*, *Equus* and *Bos*, which

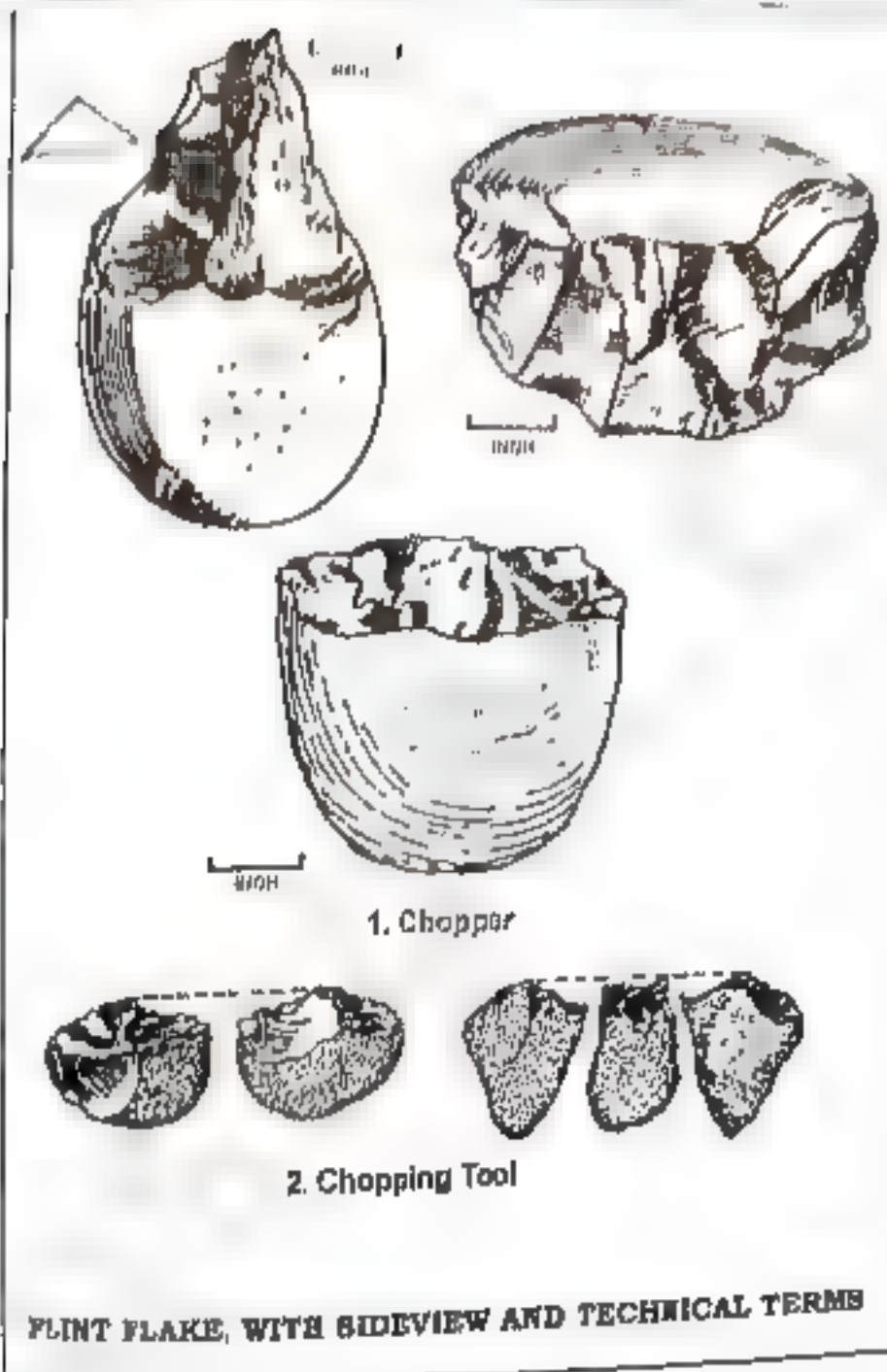
appear suddenly in the Tatal zone and continue onwards. This was taken to mean a Villafranchian faunal 'break' and hence marking the beginning of Pleistocene.

Subsequent deposits in the Potwar region have also been likewise compared with the glacial deposits in the Kashmir area and a tentative correlation was derived as regards to both the kind of deposition as well as their faunal contents. Interestingly enough, after the Potwar plateau was fixed with the lacustrine deposits of Pinjaur the river Sohan started flowing over this newly formed plateau. During the advance of the Himalayan glaciers huge debris was pushed along the course of the glaciers and this was taken down further along the course of the river by the melt water as it descended to lower altitudes. Further, at the lower altitudes the glacial phenomenon is believed to have resulted in a period of heavy rain fall or pluviation. Thus, what the melt water could not carry could now be flushed out by the swollen river fed by pluviation. Hence, in Potwar region thick deposits (occasionally as much as of 500 meters thickness), made up of these concretized boulders, were laid down. The fauna recovered from these boulder conglomerates are designated typologically as Middle Pleistocene. These include open forest and moisture loving creatures such as elephants, horses, buffaloes, wild cattle and hippopotamus, turtle and crocodile.

In the subsequent phase, there was a degradation in the river and consequently, a large expanse of the earlier bed was exposed by erosion. This rhythmic oscillation seems to have continued with the alternate climatic cycles. This changing regime of the river is termed as aggradation (for raised water level i.e., pluvial climate) and erosion (for depressed water level i.e. inter-pluvial climate) phases. Several tributaries of the Indus are recorded to have formed 4-55 terraces representing these phases of climatic fluctuations. In the figure overleaf a simplified version of these terraces as described by De Terra and Paterson is reproduced.

At places like E. Africa the earliest known creation of man occur beyond 1.58 my. These can be demonstrated as having gradually modified into handaxes-the next group of





types. In Europe where Lower Palaeoliths emerge around 0.6 my, there is an indication of these forming a regional trait parallel with handaxes. In India Lower Palaeolithic does not emerge before 0.2 to 0.3 my and here these occur as an integral part of handaxe culture.

The Zone T₂ is aggradational and is composed of boulder conglomerate. The fauna associated with this is typical Middle Pleistocene type and is commonly referred to as 'Narmada fauna'. This deposit is comparable with the Karewa deposits belonging to Ind Himalayan glaciation in Kashmir.

The Zone T₁ is cut during the next erosional phase and the deposits on it as such can be dated to the Ind Himalayan interglaciation period. Being erosional in nature it is mainly constituted of redeposited boulders which are found in a loose form in this terrace.

The Zone T₂ is aggradational and hence is datable to the subsequent pluviation, i.e. the period of the occurrence of IIIrd Glaciation in sub-Himalayan Kashmir. It is a height of 120 from the present river bed and has two distinct units. The lower layers are gravelly and are termed as Potwar basal gravels. This is overlaid by a fine layer of loess or silt which is called Potwar Loess.

The Zone T₃ is an erosional terrace and hence shows only redeposition of earlier material. It is equated with the IIIrd Himalayan interglacial phase.

The Zone T₄ records the last aggradational phase of the river Sohan. This deposit is mainly constituted of a mixture of pink silt, sand and fine gravel. In keeping with the postulated climate sequence this is equated with the last and the final glaciation phase in the Himalayas. Hence, it also marks the final deposit of Pleistocene.

The Zone T₅ is the last terrace recorded at Sohan and it is interpreted as belonging to the early Holocene.

Thus, the second glaciation onwards upto the end of Pleistocene the Sohan terraces provide a very clear climatic and hence chronological succession. A large number of tools of prehistoric man were also collected by the authors in the course of their explorations of the region. These are very briefly described by De Terra and Paterson. A very clear chart of the tool illustrations which accompanies these descriptions largely compensates for much of the lack of typo-technological details in the text. It is important at this point, to mention that a strict typotechnological approach in

describing Palaeoliths was yet to be grounded on an accepted methodology of prehistory at this period of time. In spite of this, the description of the tool types and their techniques of manufacture are in many ways commendable.

Pre-Sohan. The tools collected from the surface of the boulders of the T₀ terrace have been grouped together with a view to propose a cultural stage similar to what Gabriel de Mortillet proposed for the Somme valley in France. The latter proposed the term *Pre-chellean* and De Terra and Paterson proposed the term *Pre Sohan*. These tools were picked from at least ten localities. In the language of the authors, these were, "Big flakes made from quartzite, all in very worn condition, with large plain, unflaked striking platforms mostly at low angles, varying from 100° to 125°. The bulbs are flat, but the cores (bulbs) are well developed, some of them very large. The upper surface is usually unflaked except for one or two small irregular scars. There is no secondary working on any but one specimen from Kallar, where small flakes of later date have been struck from the main upper surface" (De Terra and Paterson, 1939: 304-305). The absence of any working in these flakes made them a suspect and many later commentators discarded them as pseudoartifacts. Both Movius in 1944 and Fairservis in 1975 however, felt that these could be the manufacturing debitage of an early Sohan industry which was described from the next terrace (T₁). In case one accepts them as a part of Early Sohan then Pre-Sohan would definitely qualify as one of the earliest known human cultures in the whole of Euro-Asia.

Early Sohan. From a large number of localities tools were collected from within the T₁ context. These, according to the authors were datable to the IInd Interglacial. Most of these tools were prepared on good size pebbles of various shapes and sizes. Some flakes were also described. The entire collection was given the cultural name of Early Sohan. Before describing the tools from this group the authors tried to form an internal chronology by dividing the collection in three groups based on the state of preservation.

Early Sohan A. Specimens collected from the T₁ context and found to be heavily worn and deeply patinated in brown

to purple colour were grouped in this category. The number of specimens falling within this category was, however, not numerous and hence a true assessment of a true type preponderance will neither be possible nor free of fault. The specimens described from this group consist of several discoid cores with only a few flakes removed from the borders and a rather big unifacial chopper, again produced by the removal of minimum flakes. No description of flakes is to be found in this group.

Early Sohan B comprises of specimens which are as deeply patinated as in Gr A, but are much less worn. In this phase numerous pebble tools of various kinds are seen to occur. These are prepared on moderately big pebbles and in almost all cases maintain large areas of original pebble cortex. Real massive pebbles, as found in Gr A, although in a single sample, are no longer found.

The numerous associated flakes continue to be high angled and unflaked but some among them show further flaking. In this regard these flakes compare well with the Clactonian flakes of England. The cores are more neatly worked and three essential types have been identified in them. These are choppers, chopping tools and discoid cores. Much of these flakings—both on the pebbles as also on the flakes—show a degree of control introduced by adopting the step flaking technique. De Terra and Paterson identify two different techniques of pebble flaking. They call them as (i) Flat based and (ii) Rounded pebble technique. In the former a flat under-surface is first obtained (or may be only such pebbles are selected which have a fractured flat under surface). Subsequent flakings are done with this flat surface as the platform.

Thus, when a unifacial chopper is prepared by this technique, the working border is always straight. In the rounded pebble technique the flakes are removed from the original rounded pebble surface without any adequate platform. Tools prepared by this technique either have a convex working border or when the blow is delivered from opposite borders, a pointed end. In the latter case, unless unifacially worked, these specimens compared well with

primitive pebble hand axes known from elsewhere in India as also broadly with many specimens of Europe and Africa.

Early Sohan C constitutes specimens which are least worn and patinated. Pebbles again dominate the scene, with choppers chopping tools and discoid cores forming the main typological categories. Some of these pebbles have also been described as 'side choppers' perhaps because the working border runs along the length rather than the breadth of the pebble. The flakes show a larger degree of modification when compared with their counterparts in Group A and B. Single faceted flakes with evidence of greater amount of primary dressing appears for the first time, although these still remain without any typological retouchings.

Late Sohan specimens collected from the T₂ context are termed as late Sohan. Since T₂ maintains two stratigraphic units- the Potwar basal gravel forming the older layer and the Potwar loess forming the younger layer- the tools from the former group are separately designated as Late Sohan A and those from the latter group as Late Sohan B. These tools are found from several localities within the Sohan-Indus region and virtually merge with another implementiferous zone, around 17 Km South of Rawalpindi, called Chauntra. In the latter zone a deposit similar to the Potwar basal gravel records more than 100 specimens of handaxes and cleavers. It would, therefore, seem that a non-biface tradition distantly comparable to the Clactonian stage of England occur in Punjab along with the biface tradition somewhat parallelly.

Both late Sohan A and B show almost similar core tools in them. The types are all finished in medium sized pebbles of various shapes with neat primary and secondary flakings. The secondary flakings usually show the mastering of a resolved flaking technique. The types include a number of chopper and chopping tool besides the usual types of discoid cores. Often flattened circular pebbles are chosen for these and alternately flakes are removed from both the surfaces in a circular manner. There are some specimens described as 'turtle back type' which are flat split pebbles in which the fractured surface has been flaked all over so that

the observed ~~remains~~ as an evenly convex pebble core, with some minimum flaking done at one end or corner. The flakes in Late Sohan A and B show progressive development. Levallois flakes and tortoise cores are much plentiful. Some of these flakes are also retouched in a much type as wire scrapers or small cutting tools. Blades or 'bladish' flakes are also reported from Late Sohan B. Looking at the total character of the Late Sohan, one is left with no doubt that it is essentially a flake dominated industry. But the core component and the chronological ascription of the terrace would make it difficult to accept it as Middle Palaeolithic as some authors seem to propose in later works. De Terra and Paterson felt that the Chaulatra site shows a mixture of Late Sohan with Abbessian-Acheulan traditions. The material is divided by them into three groups on the basis of the degree of weathering evidenced on the collected specimens.

(a) Well-rolled and crude specimens. This group includes Abbessian handaxes, some pebble cores and a few massive flakes without much secondary workings.

(b) These included medium-rolled specimens which show at least a lesser degree of weathering than the earlier group. Tools falling within this group include Early Acheulan and Middle Acheulan handaxes and some cleavers.

(c) This group includes both fresh and unrolled specimens. Besides the Late Sohan type core and flakes Paterson illustrates some cordates, pyriforms and ovates which are the thin bifaces that characterize Upper Acheulan in France. Cleavers are also recorded in this group. Surprisingly none of the flakes or flake types which normally predominate an Upper Acheulan industry are described by the authors.

It is important at this point to mention that a later exploration on the Indus, conducted by Paolo Graziosi, has yielded almost an entire Upper Acheulan industry, although from a much lower region. Higher up in the Shimla Hills again, recent explorations by G. C. Mohapatra, have yielded a typical Upper Acheulan industry. B. B. Lal's explorations on the Beas-Banganga region in Kangra, on

the other hand, almost duplicate the findings of De Terra and Paterson. Iai found the same number of artefacts at almost comparable heights with almost an entirely pebble dominated industry. In a collection of 52 specimens only 4 are counted by him as bifaces. It will, therefore, appear that at Chaunira we are probably dealing with the northernmost limit of an Acheulian intrusion which at least for Punjab has a further western origin. The Sohanian group, on the other hand, is fairly widespread further north in Tadzhikistan and hence may be independent of the Acheulian. In 1964, K V Soundara Rajan had proposed that Sohan, in the fact of its not showing appreciable internal dynamics, might be representing an 'endogenous' culture. It was around the same time that an alternate hypothesis for the pebble culture of India was mooted by A P Khatri. He claimed that a pre-biface existence of pebble tools is stratigraphically evidenced at Mahadeo Piparia on the Narmada and hence pebble tools in India must have evolved into bifaces independently after the pattern of Olduvai Gorge in East Africa. If one can extend Khatri's argument into Punjab, Soundara Rajan's proposal would mean a stagnation of an archaic element into the Punjab plateau. Seen in the present light of our knowledge most of these opinions would seem unlikely. Firstly, no pre-biface layer from Narmada has so far been found. Secondly, the biface layer at Narmada can at the most be dated to early Eemian or Upper Pleistocene if one has to go by all available evidences. Hence, even if Khatri did find a pebble tool underlying the bifaces, one cannot expect the Olduvai pattern of cultural evolution to repeat the same pattern in India after a lapse of nearly 1.6 million years. In the context of Punjab, the recent studies in Himalayan glaciations seem to bring out certain well attested facts which not only complicate the earlier evidences at both Sohan and Banganga but also nearly demolish their entire chronology and hence cultural succession proposal. It would appear that the only glacio-fluvial load that came down to the Patwar region from Kashmir was the Boulder Conglomerate and this episode is estimated to have taken place around 1.9 million years ago. All the terrace deposits are in fact derived from this deposit during a process of extensive and repeated tectonic motion

that rocked the entire area during early Pleistocene. If these terraces are not created by the river the entire logic of a climatic succession fails and hence the tools from almost every terrace become broadly contemporaneous. The lack of internal dynamics of Sohan culture as alluded to by Soundara Rajan will, therefore, seem to be explainable at one stroke.

One might ask at this stage about the need of continuing with De Terra's scheme of succession in the North Western Prehistory, specially in the light of the statements from Deniel and Rendell in the recent years. To quote, "We conclude that an entirely fresh start needs to be made in investigating the Plio-Pleistocene and Palaeolithic sequences of northern India and Pakistan. What has to be kept in mind is that the area is highly unstable tectonically and so it is highly improbable that the geological deposits contain a sequence reflecting climatic change alone. Secondly many units are time-transgressive and thus units such as the Boulder Conglomerate cannot be used as marker horizon. Instead each local sequence has to be dated independently by palaeomagnetic and radiometric dating techniques." It should not be entirely unwise to recommend that we continue with the format suggested by De Terra, if not for anything, at least for historical reasons. Further the evidences reported by Ranov from Tadjikistan and also the recent discoveries at Dina, Jalalpur and Riwat in north west Pakistan definitely indicates a fairly wide spread Lower Palaeolithic occurrence in the entire region. It is also important to note that some of the absolute dates for these occurrences are very impressive. For instance Riwat is dated to C 20 my and Dina and Jalalpur are put within 500,000-700,000 bracket.

Thus, one might say that both the cultural features and the antiquities recorded by De Terra may not be incorrect but their inner succession seems to be grossly incorrect.

2. The Western Region

Since the western region of India is contiguous with Punjab, although vastly different in ecological features, we might consider Rajasthan and Gujarat as a separate zone in

Western India. Today, except for a strip of coastal zone in Gujarat and the region East of the Aravalli the majority of Northern Gujarat, Rajasthan, Haryana and the plains of Punjab can be broadly counted as forming a single region. The Palaeolithic occupation in this combined area is fairly rich and well represented. In fact one of the tentative dates for the Lower Palaeolithic culture in this zone has been a U. Th date which indicated its antiquity as being around 120,000 years ago. This is also an estimate done purely on faunal grounds of the Naranda basin gravel, which has also added a *Homo erectus* skull fragment in the recent years. Both Saurashtra and Rajasthan also have received a great deal of attention from several other allied sciences in the last one decade. Eustatic beaches, marine formation and their absolute dates from Saurashtra coast and pollen profiles and their dates from Rajasthan lakes and lately at Didwana near Jodhpur comply with an almost complete picture of climatic succession in this area from almost as early as 20,000 years. This shows that the region has been passing through numerous wet or moist periods in the past. Besides helping the development of a finer and firmer chronology for the region, these studies also carry a 'moral' for the archaeologists. Our trying to establish two wet phases in most of the Indian rivers on the basis of the number of gravels observed might in reality be blanketing out finer details of climatic fluctuations in these regions. Minor moist phases might not carry gravels and, in common sense logic, such phases would seem more congenial to human occupation than an acute pluviation. In other words, if between two pluviation there had been 'n' number of moist phases of say 1000 to 5000 years duration all these 'n' number of cultures are bound to be considered as contemporaneous if a subsequent pluviation sweeps them into one gravel deposit. We have no possible way to remedy this inherent problem unless Didwana like excavations are conducted in suitable chosen alluvial zones in the peninsular areas.

Rajasthan

As one proceeds south of Punjab through Haryana, an area of nearly 300,000 square kilometers of desert occupies this region. Further south, one encounters a little less arid area

of a seasonal rainfall not exceeding 100 cm in the Saurastrian landmass. This entire western zone has yielded a rich harvest of Harappan and associated Chalcolithic sites. For long the possibility of Palaeolithic sites from this area was taken to be very little but recent studies have shown that in all likelihood the area was perhaps as heavily occupied during the Palaeolithic period as in the rest of the river valleys in India. Across the Aravallis, which maintain a much moister climate today, one of the richest Palaeolithic sites has been discovered by Misra in Chittorgarh. Of the many streams that originate in the Aravallis and flow eastwards to meet the Banas and through the Banas meet the Chambal which finally joins the Jamuna, river Gambhari is the southernmost one. It is almost in the south-eastern corner of Rajasthan. A large number of sites along this river show an exposed pebbly conglomerate - the pebbles never exceeding 3-4 cm in diameter. This is a very hard and completely concretized deposit occurring at places overlying a fairly thick clayish deposit. It is believed that the clay which forms the lowermost deposit is caused by weathering of the primary rock before the conglomerate was laid down. In the absence of adequate fauna it would appear that the implementiferous deposit belongs to the Upper Pleistocene period, especially because there is no other gravel deposit recorded in this river or for that matter the other tributaries of Banas in the north. The tools collected from numerous localities along the Gambhari and Betwa basins show quite an advanced typo-technological status. Nearly 38 percent of the specimens are handaxes and cleavers, the rest are choppers, discoids and flakes. The quartzite chosen for the tools has a very fine texture and almost all the tools show a very high degree of refined working. The most important feature of this industry is the occurrence of a fairly good number of denticulate handaxes (4 cm - 6 cm) along with the normal sized (22 cm to 15 cm) biface. Almost all the varieties of Upper Acheulean bifacial types including ovates and cordaxes have been recorded in this industry. The flakes include several levallois-like flakes besides some retouched into side-scrapers and knives. The cleavers are both unifacial and bifacial in type - mostly U-shaped. Pointed-butt cleavers are virtually absent.

Considering that here we are dealing with a Late Acheulean industry the absence of pointed butt choppers on the one hand and the presence of numerous choppers on the other, would seem surprising. Archaeologists might be tempted to hurry into giving some explanation for this, but in the light of what has just been discussed about depositional sites in the preceding pages we will refrain from trying to attempt any explanations. Up north, along the Chambal valley as well, several massive Lower Palaeolithic have been picked up by Misra. These evidences will clearly indicate a much congenial climate around the eroded and desiccated Aravallis. The northernmost extension of these ancient hills cuts across south and south-western Delhi, and even here, more than a dozen Lower Palaeolithic clusters have been recently reported. All these occurrences show an Upper Acheulean technique and typological characteristic. Unfortunately, beyond Delhi, Haryana and the plains of Punjab still remain almost *terra incognita* in-so far as the presence of Lower Palaeolithic man is concerned.

The spectacular discoveries at Didwana near Jodhpur in western Rajasthan would indicate that these Lower Palaeolithic colonies were by no means located on the eastern slopes of the Aravallis only. More than 30 Lower and Middle Palaeolithic sites have now been recorded on the hilly terrains lying west of Aravallis. Most of these have been recorded in the ancient river beds of the region and are situated at an elevation of more than 1000 feet above mean sea level. This would seem to indicate that the sites are more concentrated on the upper reaches of this ancient drainage network. Since January 1980 Misra had organized a multidisciplinary investigation of a very rich Acheulean site called Singi Talav near the town of Didwana in Nagour district of Rajasthan. Misra felt that the tools show enough evidence of being in primary contact. The extensive study of the excavated material showed three distinct depositional phases in this region. These are termed as Jaisal, Amarapura and Didwana formations. Of these the Jaisal group seems to have been laid down during late Tertiary and lower Pleistocene and shows an extremely powerful drainage force. Huge deposits of boulders in concrete form measuring 20m to 60m in thickness have been found lying over a

stretch of nearly 16 km. Apparently human habitation occurred in this region immediately after this period, during the Amarapura phase, which shows a very slow sedimentation rate probably because of the gradient having become very low as a result of excessive rise of the bed during the earlier depositional phase. Most of the evidences of early man in this region come from this deposit. Acheulian tools are found from around the middle part of Amarapura formation and Middle Palaeoliths are found in the upper part of the same formation. Misra felt that in all likelihood the Acheulian industry at Singi Talav should date to be Middle to upper Middle Pleistocene. In his own words, "If this dating proves to be correct, then the Acheulian industry found at Didwana will be one of the earliest Lower Palaeolithic industries found in the Indian sub-continent". The tools collected from the excavations at a number of rich sites in and around the district show a group belonging to an Early Acheulian stage as also a Middle Acheulian stage. The Early Acheulian types stratigraphically occur earlier than the later stages. The tool types show a high frequency of choppers and chopping tools with massive handaxes prepared only by stone hammer technique in the Early Acheulian period. The subsequent stages of Acheulian show progressive development in both types and techniques. Most of these show consistent occurrence of coppers with handaxes while cleavers are always absent. It is only in two Upper Acheulian layers that cleavers occur with thin and symmetrical Late Acheulian handaxe types. The exceedingly high proportion of debitage found in almost all the digs leaves no doubt to the fact that in western Rajasthan open air river bank occupation was the usual manner of human occupation. Increased wind activity with small periods of relatively humid climate marked the Didwana phase. Apparently, there was a thinning of the human colonies at this phase, although both Upper Palaeolithic and Mesolithic sites are reported from other adjoining regions in Western Rajasthan.

Gujarat

Two important river systems flow through this region which is for the most part covered with the Deccan trap in the

south and Pleistocene and recent soil in the north. Besides Sabarmati and Mahi, which are situated in the north and the central regions, numerous other water courses including the gigantic Narmada flow all along the coast. Being situated south of the largest desert in India, it shows a remarkably steep decline in rainfall as one proceeds from the south (200 cms) to the north (70 cms). The Saurashtrian appendix is further arid as compared to the south Gujarat coasts because of the absence of as many water courses in this region. However, it is not unlikely that like Rajasthan, this area also maintained a large number of water courses which are nearly all extinct in the present. The river Bhadar along which the late Harappan site of Rojdi occurs at present, is the only river of substantial flow. Lower Palaeolithic sites have been found in almost all the river courses of Gujarat including the ones in the Saurashtrian peninsula. In fact, the richness of these sites can be taken as an indicator that most of Gujarat maintained a favourable dry tropical forest and, perhaps, also a deciduous forest in some parts, for periods in Pleistocene. The stratigraphy recorded in Bhadar shows distinctly two gravels, but in Sabarmati only one basal gravel was found. In Mahi, Orsang and Karjan (the two tributaries of Narmada), the two-gravel succession is again repeated. Almost all the Lower Palaeolithics are recorded either *in situ* or are eroded from this basal gravel. It is extremely difficult to put any broad chronological status to this industry but typological evidences show, beyond doubt, that a very late and advanced Acheulian is invariably present in almost all the known Lower Palaeolithic sites in this region. In fact at Orsang finds associated with the Acheulian include a long blade prepared by levallois technique. This leaves no doubt that the first aggradation in many of the northern courses might have taken place as late as Upper Pleistocene. However the evidence from Limrethi in coastal Saurashtra, which puts the presence of man to approximately 120,000 years ago, can be taken to surmise that the earliest aggradation in the Gujarat rivers may have commenced as early as late Middle Pleistocene to early Upper Pleistocene and continued with short phases of drier spells for a fairly long period of time, may be extending to several thousand

years. It is only in some regions that the later end of this depositional phase is recorded while in others more duration is covered by the deposition. There is no doubt that fairly archaic character of Clactonian flakes, primitive choppers prepared by the removal of only a couple of flakes and massive Acheulian handaxes are fairly common in almost all the sites on these water courses but the late Acheulian elements accompanying them are also remarkably advanced in technique. These include both pebble-butted handaxes and flake-cleavers prepared by cylinder hammer technique. Levallois flakes, discs or discoids are typically Middle Palaeolithic in size and shape and yet they have been described within the Lower Palaeolithic assemblage. So, here we can almost clearly demonstrate that our depositional gravels of the river beds, if taken as the delimiting frame for different cultural periods, can create more confusion in our understanding than otherwise. It will, therefore, be sufficient to accept that Lower Palaeolithic population was not only present in Gujarat but they remained there for a sufficiently long period to be able to evolve into the successful late Acheulians.

3. Central Region

The Central region is an expanse of landmass of more than 1200 Km. length along the tropic of cancer. It covers the whole of the present state of Madhya Pradesh perhaps with the exception of the district of Bastar which lies too far in the south to be considered within the central region. Aravalli ranges in the west and Maikal ranges in the east mark its northern border while the rivers Tapi in the west and Mahanadi in the east mark its southern border. Deccan Lava covers most of this region specially lying south of the river Narmada which flows from east to west. Several other affluents of the Ganga-Jamuna system originate in the north of the Narmada and flow northwards. The entire area of this region has yielded one of the richest amount of Palaeolithic sites. Almost all the river valleys and their numerous tributaries have yielded Palaeoliths from almost the earliest type-technological stage to the most advanced forms. Narmada, of these, has attracted many archaeologists from as early as 1939. De Terra, after his

experience at Sohan, wanted to link up the glacio-fluvial depositional cycle observed in sub-Himalayan zone with the depositional history of a purely pluvial area. Narmada flowing along the tropic of cancer, was a natural choice. In the main Narmada between the cities of Hoshangabad and Narsinghpur several denuded evidences of Pleistocene deposits could be identified by them but a proper stratigraphy of these deposits, which could enable the reconstruction of the past climatic regimes, was possible from a tributary of Narmada near Harpur. Six depositions were identified overlying a primary lateritic bed forming a two terraced structure. The river is flowing over the first or the oldest deposit. This along with a younger concretionary clay called the Pink clay, was designated as the Lower Group of Narmada. The Basal conglomerate of the group yields *Bos namadicus* and *Elephas namadicus* in large number and on the strength of these and other archaeological evidences the Lower Group was designated as co-eval with T_0 and T_1 at Sohan. Likewise, the Upper Group, which occurs over the Lower Group, was taken as co-eval with T_2 and T_3 terraces at Sohan. These constitute a sandy gravel deposit and an orangish silt. Finally this thick deposition was cut by the river and the deposits are spread at a lower level in a terraced structure. This lower terrace is termed the cotton soil or *Regur* Group and is constituted by a sandy loose gravel followed by a thick black soil. Extending the same logic, De Terra correlated these to T_4 and T_5 of Sohan. Thus, he could propose almost a complete successional history of rivers of pluvial zones from second Glaciation onwards. If one was to go by the above-mentioned study, the Pleistocene chronology of Narmada would read as shown on the next page.

The recent discovery of the calvarium of **Narmada Man** and the numerous archaeological discoveries of the classic Abbevillien-Acheulian industry are all attributed to the oldest Narmada deposit and hence belonging to early Middle Pleistocene. Gregory Posschl in 1975 took stock of the available date and concluded that no alluvial deposit in India can be put to a date older than last Interglacial. Therefore, the correlations sought with Potwar would seem

Holocene P L E S T O C E N E	Potwar		Narmada
	Upper	T ₅	Cotton Soil
		T ₄	Grave of the Regur Group
		T ₃	Orange Silt
	Middle	T ₂	Sandy Gravel
		T ₁	Pink Silt
	Boulder Congl		Basal Gravel
	Lower	Pinjaar Tatrot	Wet phase resulting in Laterite formation. River is almost non existent.

entirely discarded. The tools collected from the Narmada Basal gravel also would seem to support a much younger date for this deposit, specially in view of the late Acheulan types of handaxes and cleavers described in these assemblages. The fauna which have been often referred to by various authors would indeed seem to appear to be more correctly belonging to Upper Pleistocene than otherwise. The total Narmada industry has yielded massive sized handaxes, cleavers, choppers, chopping tools and several clactonian flakes. Together, they produce a picture which spans the cultural evidence of at least a million years (in one geological stratum) if one can compare the Lower Palaeolithic duration of E. Africa or even parts of Europe.

There are, at least two clear evidences of the fact that the Narmada Lower Palaeolithic known so far is actually a mixed deposition. One of these comes from a site called Hathnora where *Homo erectus* was discovered on the Narmada and the other is a primary site 40 Km away from the river in the rock shelters of Bhimbetka.

Hathnora is replete with large mammal remains of late Pleistocene date. *Equus*, *Dos*, *Cervus*, *Dubalus*, *Hexaprotodon* and numerous other mammal remains have been found in association with the late *erectus* calvarium. The

conglomerate which yields a (these evidences as what Le Terra had described as flint conglomerate and what would now appear to be of the late Pleistocene or of an of international chronology. A large late Acheulian assemblage has been discovered from across the river from Phansi from the same or similar geo-morphological context. Two things become immediately clear from this spectacular discovery

1 The tools are made on or ho-quartzite, which is not available within 60-40 km of the site. Both at Bhimbetka and Barkhera, the same raw material is used and is also locally available. This would mean that Hathnora assemblage should, quite logically be only an extension of the Bhimbetka Lower Palaeolithic culture. Chopper-chopping tools or Abbevillian handaxes are conspicuous by their absence in these three industries. That is, Narmada and their near-around rock-shelters were occupied by late Acheulians in late Pleistocene period and in all probability the author was an Early sapiens of the Hathnora kind

2 Chopper-chopping tools and the massive Abbevillian handaxes which form an integral part of the Acheulian tools in almost all riverine sites may in all probability represent an earlier phase of Lower Palaeolithic existence and are not contemporaneous with the Acheulians. This early phase may be at the most dated to the beginning of the last interglacial. That is, around 160,000 years ago these regions of India get populated and nearly around 100,000 to almost 80,000 years ago late Acheulians take over. It is important, at this juncture, to mention that all late Acheulians do not occur without chopper-chopping element. Adamgarh, which is another late Acheulian rock shelter in this very area, shows chopper-chopping types occurring in fairly good frequency along with the late Acheulian bifaces. This feature of chopper omnipresence is recorded in many other sites of both Europe and Africa and hence need not be taken to identify a mixed industry. On the other hand, Abbevillian types or Clactonian flakes are virtually absent in all these Acheulian sites. Many authors have even tried to distinguish these late occurring choppers on the basis of technological features and we would tend to

agree with them. That is to say, if choppers or chopping tools show cylinder hammer scars or evidence of removed flaking technique, these need not be identified as late Acheulan in cultural or chronological terms.

Bhimbetka is the name of a cluster of an unusually large number of caves and rock-shelters in the Raisen district of Madhya Pradesh. It lies about 40 km north of the northern bank of Narmada while Adamgarh, another cluster of rock-shelters lies only 3-4 km south of the southern bank of Narmada in Hoshangabad district. In the entire area more than 700 caves and rock-shelters have been enumerated by V S Wakankar who discovered them in 1962. One of the largest of these caves measuring nearly 40 x 12 x 15 meters and numbered III F 23, was excavated by V N Misra during 1966 to 1976. Almost 4 mt deep cave soil is crisscrossed by unusually big caved in boulders could be dug out by the excavators. Layers were identified on the basis of associated archaeological material alone. In all 8 layers we recorded of these the oldest three layers, viz., layers 6 to 8, yielded Late Acheulan industry. Layer 5 produced Middle Palaeolithic and layer 4 yielded Upper Palaeolithic. The next three layers superimposing these were Mesolithic. Although the excavated cave did not contain much painting but others adjoining them, in fact almost 70 percent of the total caves, yielded a large number of paintings in yellow to deep tan ochre. Most of these paintings are ascribed to the Mesolithic period although few of them are suspected to be late Upper Palaeolithic in age also.

Misra records nearly five thousand artifacts from this excavation and these include several mammoth flake cores and hammer stones. The latter leaves no doubt that the tools were prepared right within the cave. Finished tools account for nearly 32 percent of the total collection. Bifaces among these account for nearly 4 percent. These are one of the most spectacular types known from Bhimbetka. Some of them are as long as 22 cm and yet the thickness never exceeds 25 percent of the length. In technique these exhibit one of the best forms of Upper Acheulan types from the whole of India. Cleavers are almost as a rule prepared on large flakes and constitute a ratio of 3 : 1 with the handaxes.

Such a preponderance of flake cleavers, often with only truncated scars forming the dorsal surface, is only a peculiarity of Bhimbetka Acheulana. Levallois flakes form a very high percentage of the finished types (12 percent). Side scrapers, points, backed knives, denticulates, notches and end-scrapers constitute nearly 28 percent of the total types. Absence of chopper-chopping and Abbevillian type isolates this from almost all the known Lower Palaeolithic sites of India.

Adamgarh A series of rock-shelters on the bank of the Narmada in Hoshangabad district were excavated by P. V. Joshi. These provide several features which are comparable to Bhimbetka and hence are always mentioned together. The paintings which abound in these shelters are almost of the same pattern as those known from Bhimbetka. The tools are also prepared on the same variety of raw material. The Acheulan artifacts are recovered from only two trenches and they number only 93 in total. Microolithic level, however, shows much denser occupation. The Acheulan tool types identified are more than 34 percent choppers while handaxes and cleavers together form only 15 percent. Besides these there are some discoids, side-scrapers and points also identified.

Further East in Vindhyan Uttar Pradesh, the Lower Palaeolithic industry described from Belan region in Pratapgarh district offers another peculiarity of this period. Here G. R. Sharma has claimed a basal gravel exposure with almost the same range of Upper Pleistocene fauna as is known from Narmada. The Lower Palaeolithic types recorded from the surface and attributed to this basal gravel, show a large range of moderately sized (10-12 cm) handaxes and cleavers with very fine-shouldered butt-end. Many of these handaxes are also made on flakes. One can again see that these Lower Palaeolithic types are almost on the threshold of transition of Middle Palaeolithic. The flake component of these Lower Palaeoliths compares perfectly with the French Mousterian.

It is important at this point to remember that a typical Mousterian of the kind described from France is not known in either England in the East or W. Germany in the West.

In fact if one was to compare our central region Acheulians with either Baker's hole (England) or Lehringen and Salzgitter-Lebenstedt (W. Germany) one may not find any particular dissimilarity. Perhaps an absolute date for our late Acheulian (at least in Central Region) would have made our problem of ascription much easier.

4. The Eastern Region

The eastern region is mainly alluvial for almost half of its northern length. This is the region through which the gigantic Ganga-Jamuna-Son and the Brahmaputra system drains. Present states of Bihar, West Bengal and Orissa constitute the western wing of the region. the eastern wing which lies east of Bangladesh was earlier known as Assam and the North East Frontier province but is now divided into 7 different states - Assam, Meghalaya, Arunachal Nagaland, Mizoram, Tripura and Manipur. The southern region of the western wing and almost the entire eastern wing is formed by mountains and forests which at places almost take up the character of a tropical forest. Palaeolithic sites mainly occur in these mountain rivers or along the higher slopes of adjoining mountains. Prehistoric research in this region seems to be still of an exploratory nature. So far we have only two Lower Palaeolithic sites which have been excavated.

Orissa

Orissa includes a broad coastal plain, the south east, which has the delta formed by at least two major rivers, viz. Mahanadi and Brahmani. Besides these Burhabalang and Baitarani also drain a large expanse of inner Orissa. in fact if one proceeds upstream along these rivers one can at once get higher up into the numerous undulating hills which continue north-wards into Singhbhum district in Bihar and Midnapur district in W. Bengal. Nirmal Kumar Bose and Dharani Sen reported their excavation at two quarry-pits in Mayurbhanj district in a valley formed by the ancient Burhabalang river. These two pits, **Kullana** and **Kamarpara** did not yield any satisfactory stratigraphy except for the fact that a rich Lower Palaeolithic culture occurs from a gravel bed extremely stained with laterites.

Subsequently on the clues provided by Valentine Ball who surveyed the area during the last century, the present author could collect more than 1000 Lower Palaeolithic specimens from at least 3 more sites proceeding from Balasore to Bangriposi. The stratigraphic context of all these sites of Burnahalang shows a highly laterized pebbly gravel occurring over very compact lateritic bed. The implementiferous bed at places is covered by merely 30" of soil with redeposited lateritic pellets but at places like Kuhlana and Kamarapara, these occur 2 to 3 feet below surface. No fossils have so far been recorded from these beds and therefore an estimation of their chronological status is done purely on a type-technological basis. At Kuhlana and Kamarapara almost 50 percent of the tools described are chopper-chopping in type. But in association with these both Abbevillian as also Acheulian handaxes and cleavers of a rich variety are identified. Even these are very often seen with pebble butts. At Kamta and Bangriposi, handaxes of a very advanced Acheulian form are seen with a fairly good amount of levalloise flakes but with very few chopping tools. Choppers are almost conspicuous by their absence. It is significant that Mohapatra, who surveyed the river Mahanadi, recorded almost the same picture under almost similar geo-morphological context. He had, however, formed a kind of type-technological succession in order to visualize an internal evolution. It might be quite revealing to see the contents of the three stages in which he divides his collection:

Stage I : Handaxes, irregularly flaked bifaces, flakes, scrapers, irregularly flaked pebbles.

Stage II : Handaxes, cleavers, scrapers, cores, flakes and irregularly flaked pebbles.

Stage III : Handaxes, cleavers, scrapers, points, flakes, cores and irregularly flaked pebbles.

Handaxe forms the ubiquitous component of most of the Lower Palaeolithic culture all over the world. Being a tool type which stays with man for the longest duration, it can have numerous internal variations. Cleavers start occurring with the Acheulian handaxes.



1 An Abbevillian Handaxe



2 An Acheullan Handaxe



3. Cleaver

His survey identifies three wet phases of which the last two wet phases are recorded by the river in its alluvial deposits. Lower Palaeoliths are believed to be derived from the 11th wet phase.

Further west in Sambalpur district the present author, in collaboration with Kitha discovered a huge lower Palaeolithic assemblage from one of the tributaries of Mahanadi at Kuchunda. The industry undoubtedly shows a pebble preponderance but handaxes and cleavers are by no means lacking. The evidence of cylinder hammer is not clear or for that matter levullose flakes are also recorded. Thus we see that the Chinwanagpur region of Orissa had maintained a fairly large human occupation around the same time when Narmada was occupied, that is, during late Middle to early Upper Pleistocene.

Bihar and W. Bengal

Districts of Singhbhum in south Bihar and Midnapur in West Bengal were originally surveyed by Ashok Ghosh. A large number of Lower Palaeolithic sites some of them suspected to be factory sites are reported on the hill slopes along the river Subarnarekha. Again, we find a generally poor chopper-chopping element in these sites although excellently preserved Late Acheulian handaxes and cleavers in various stages of preparation are identified. Further east in the districts of both Bankura and Birbhum which have parts of them covered by lateritic extension, have also yielded several Lower Palaeolithic assemblages. D. P. Chakravarty has listed most of these finds resulting out of his surveys. The concentration of these sites is distinctly thinned out as one progresses into W. Bengal. In fact most of them start occurring with a profusion of microliths. The stratigraphy of the region seems to be extremely ambiguous, notwithstanding the several claims of 'in-situ' finds. Apparently all these are incorporated in later lateritic wash of kankar and pebbles.

In the recent years a spectacular Acheulian open air primary site has been reported by Puri and Ghoshal (1991). The site called Paisra is in Monger district of Bihar. The unique features of the site can be summarised briefly.

(i) The site has preserved unmistakable evidence for habitual floors of the Acheulians and it spreads over an area of several hundred square meters.

(ii) Associated with the tools are found a large number of finished and half finished implements, flakes, cores and

other debitage. Significantly even hammer-stones, anvils and lumps of raw material have also been recovered.

(iii) The excavation has revealed several post holes and also stone alignments. These have been interpreted as demonstrating the existence of more than one type of structures.

(iv) Significantly Pausa had also been a camp site of the Mesolithic settlers in the region and has a date which puts it in the 6th millennium B.C. Incidentally this is the only radio carbon date for Mesolithic known to us from eastern India.

The tools analysed from a total of 7 localities excavated show a limited number of Upper Acheulian handaxes and cleavers and the dominant feature is of Levallois flakes and flake tools. Varieties of flake tool types dominate the industry.

In the eastern wing most of the Lower Palaeolithic sites known till date come from Meghalaya. T.C. Sharma and his students have surveyed large areas around Rongram and the adjoining hilly slopes and discovered more than 30 Lower Palaeolithic sites. There is no doubt that these come from a gravel bed but whether these could be linked with the Narmada basal gravel can not be decided primarily because of the absence of fauna. The tools collected are predominantly chopper-chopping in type although rarely a handaxe or a cleaver with pebble butt can also be seen. It is important to note that since these areas record highest rainfall in the world, colluviations are likely to be a very active phenomenon and hence identification of gravel beds should not be hurriedly linked with Pleistocene episodes.

5. The Peninsular region

This triangular region is bound by the Western and Eastern Ghats along the two borders and the southern flanks of the Vindhyan ranges form its northern limits. In the north the distance between the two coasts exceeds 1000 km while near the tip of this reversed triangle the same distance is often less than 50 km. Although most of Orissa comes within this triangle, we have considered the Lower Palaeolithic occurrence of this region along with

Chhotanagpur discussion in the eastern zone. If Orissa forms the eastern corner of the base of the triangle, Maharashtra forms in the same way the western corner of the triangle. Both these states have populations speaking languages which represent branches of Indo-European families. Rest of the zone speaks languages belonging to the Dravidian family. Further, most of this region comprising of 4 states and 4 major branches of Dravidian family of languages, fall below 18° N latitude. The southern zone except for parts of Maharashtra and Orissa is a monoclimate region. The Western Ghats extend a greater amount interiorly in the landmass of the peninsula and hence render it a hilly topography. The Eastern Ghats are much more denuded and discontinuous. Rainfall for the entire region is fairly high and maintains fairly thick sub-tropical plants and allied species. However, the central region of this triangle, which constitutes parts of Maharashtra, Karnataka and Andhra, falls under rain shadow and hence is perhaps as dry as the Saurashtra region in the Western zone. The rainfall in the drier regions can be as low as 60 cm per year while along the coasts it increases to as much as 300 cm per year. The rivers Godavari and Krishna - both originating in the Western Ghats flow south-east through Maharashtra, Karnataka and Andhra, finally these rivers open in the Andhra coast. Although majority of the landmass of the entire region is composed of the Basalt or Deccan trap, yet, at suitable gaps, there are almost the oldest Archaean rocks exposed within this region.

The Lower Palaeolithic occurrence in this region is perhaps as prolific as in the central zone. One of the earliest reports of Lower Palaeolithic culture in good detail from this region is from the Kortalayer valley in the Chingleput district of Tamil Nadu. Here a very rich and varied Lower Palaeolithic assemblage was reported by Krishnaswami in 1938. Since the river flows over a primary lateritic plain and also since the boulder conglomerate marking the first aggradation of the river occurs in two distinct terraces, an attempt was made by Krishnaswami to identify an internal evolution of the culture. The boulder conglomerate from Vedamadurai is non-laterized and hence is taken to be older than the

boulders exposed at Attirampakkam terrace which is highly laterized. The tools from the former terrace yield a mixture of Abbevillian to Acheulian types and have further been divided into several groups and series to demonstrate how the Acheulian types can be shown as having evolved from within the Abbevillian base.

Leaving aside the question of stratigraphy and internal evolution of Lower Palaeolithic in Kortalayer valley we might pay some attention to the techno-morphological features of this find. Besides a large variety of massive asymmetrical Abbevillian types entirely prepared by primary flaking, there are many specimens which compare with the Roosters handaxes described by Reid Moir in Ipswich (England) and known as **Victoria West** in East Africa. Symmetrical handaxes include both the elongated varieties like amygdaloid lanceolate and micoquian as also the smaller Upper Acheulian forms such as ovates and cordates. Cleavers are prepared both bifacially as also on flakes. The cleavers and some of the handaxes show a distinct technique of thinning a biface by a tranchet blow delivered along its length so that one of the lateral borders of the biface becomes sharp edged. Such specimens naturally develop a V-shaped cross-section. In Africa this technique was identified near Vaal and hence was named as **Vaal technique**. Francois Bordes had once argued that since this technique involves first preparation of a core and then delivering a flaking blow, it must have formed the inspiration for the levallois technique which was to evolve later. Consequently he named this technique as **para-levallois**. Besides these varieties of bifaces a large number of discoids and flakes are also illustrated in this industry. What should appear as rather surprising is the fact that the report does not record any pebble tool types from Kortalayer. The absence of any flake tool types is another peculiarity of this industry. It is sufficient to note that this is not entirely correct because a number of pebble tools and also flake tools have subsequently been reported from many of the recent explorations and excavations—specially at Gudiyam caves. However, considering the fact that the Kortalayer industry was analysed at a very early date when

flake tool types were not so well developed even in France, one can understand why Krishnaswami, the thought of designating his find with a regional emblem **The Madrasian culture**. This was to demonstrate an opposition to another regionally designated term - the **Bohannan culture**, which was at that time gaining a popularity.

Zeuner's expedition along the Gundlakamma river in kurnool district of Andhra Pradesh yielded a rich harvest of Lower Palaeolithic sites. K V Soundara Rajan, a member of this expedition, reported several localities along the Saguru (a tributary of Gundlakamma) and named them as Giddalur I, II etc. The stratigraphic context of the finds is the first cemented gravel which is exposed at several places. The lithic repertoire includes a large variety of Abbevillian-Acheulan handaxes and cleavers besides the Rostro and both clactonian and levalloisean flakes. At Nagarjunakonda on river Krishna and at Karempudi due south-east from it on Naguleru river, similar other rich Lower Palaeolithic sites are reported. In Prakasam district of coastal Andhra Pradesh Madhusudhana Rao discovered a rich Acheulan site called **Paleru**. Almost 65 percent of the collection contains handaxes, cleavers and knives and the rest constitutes of worked flakes and pebbles. Rami Reddy has recorded two more clusters from Chittoor district lying only 40 km north of Tirupati town. These are **Maratipalam** and **Chintalapalam**. The tools include handaxes, cleavers, side scrapers, scraper-cum-borers, discoids, macro lunates and levalloise flakes. Some pebble tools are also recorded. The richness of the Lower Palaeolithic content of all these sites with their numerous localities makes Andhra one of the richest centers of early Palaeolithic population. There had been attempts to show that Andhra shows a regional feature of having some so called burinated bifaces which the neighbouring regions had not developed but these are not very convincing. As far as pebble tools are concerned it has been argued that such specimens are not usually associated with the advanced bifaces, instead they are found with either Abbevillian cores or clactonian flakes. These claims are clearly aimed towards demonstrating an internal evolution, but unfortunately, cannot be substantiated in

any better way than what Kishor Nayak could do in the Kalyan Kottayyer valley.

Further west, the state of Karnataka offers a very different climatic zone. The northern region can be considered as a mountainous area of merely 4000 ft. in elevation while the western coastal strip is typically coastal in climate. The Malabarhills and Kodagupur in the southern district and Talaghatta in the central part is have yielded many Lower Palaeolithic sites in the whole of Karnataka. Joshi have surveyed these zones extensively. The results, however, do not yield any different features than what has already been repeatedly witnessed in the other peninsular rivers both in stratigraphic as also in technological characters. There is some indication of a generalized paucity of pebble tools in Karnataka when one compares them with the evidences known from Andhra. Recently Paddayya reported a remarkable evidence of a primary site from Hunagi from Shorapur doab in Gulbarga district. It seems that Lower Palaeolithic people lived on the natural floors littered with granitic blocks. Limestone pebbles and cobbles have been carried to the site to make various tools. Since no fire hearth or faunal debris are recovered to indicate a living floor Paddayya tries to demonstrate its primary context on two basic indicators. These are

- a) a remarkable freshness of the finished tools and
- b) the high concentration of artifacts on the floor.

The density of occurrence of the total 291 artifacts recorded till 1977 is as high as 13 pieces per square meter. Finished tools form a density of 4.8 tool types per square meter. The finished types include 25 percent cleavers, 16 percent handaxes, 13 percent knives, 8 percent choppers and 14 percent side and end scrapers. The typo-technological features of the industry are typically upper Acheulian although the biface at times are as big 18-20 cm in length. Paddayya has since then added 27 more localities of the Hunagi complex. All these occur along the course of the river of the same name. At one of these sites on a terrace at a height of 5 meters from the stream even a living floor has

been claimed. The various sites and number of localities under them may be summarised as follows:

Site	No. of localities
Hunsgi	9
Benhatti	3
Malpur	3
Kachaknur	1
Ankera	1
Barikhal	1
Kupi	2
Gulbal	3
Kaldevanhali	2
Chikhobbal	1
Benkanhalli	1

Proceeding with the assumption that the claim of Hunsgi being primary in context is correct, one will have no other alternative but to concede the fact that to consider chopper-chopping as a regional feature in India is totally erroneous. It is a type which has been found as an integral part of both Abbrevian separately (Giddalur-I) as also Acheulian. Its preponderance is found to decrease progressively as one progresses from the earlier to the later stages in Lower Palaeolithic. In this light we might recall the Bhamburda and Adamgarh (both primary sites) dichotomy. The former which lies 40 km away from Narmada did not yield any pebble tools while the latter which lies within a couple of kms from Narmada yields an overwhelming frequency of chopper-chopping types. It is significant that the accompanying flake component in both the sites is not only identical but also late Acheulian in character. Thus mere availability of pebbles will have to be accepted as having played a significant role in detailing the occurrence of the pebble types.

Going further north along the actual inland plain we come across the rolling landmasses drained by Godavari and its

tributaries in Maharashtra. More than one Palaeolithic occurrences from these river systems have been recorded, but in their totality lower Palaeolithic concentration is high. The site appears to be far lower in the valley than both Andhra and Karnataka. However, the site Chirki-Nevasa on river Pravara, a tributary of Godavari in Ahmednagar district requires a special attention. Here G. A. R. Corvinu has uncovered a 20-40 cm thick alluvial mantle and exposed a concentration of Lower Palaeolithic industry below it. Like Paddyas she has argued about the site being primary on the basis of artifact concentration and freshness of the tools. The primary categories of types are handaxes 34 percent; cleavers 25 percent, and choppers 36 percent. Surprising though but Chirki seem quite peculiar in many features, the most important of all these being the total absence of flake tool types which otherwise form quite a significant percentage of an Upper Acheulian industry. The handaxes and cleavers are also fairly thick when compared with the Adamgarh, Barkhera, Bhimbetka types. Furthermore, the handaxes, unlike the Central zone sites, are more often than not, shaped as a pick rather than the lanceolate forms known usually in late Acheulian areas. In terms of the degree of retouchings and final dressing, however, Chirki-Nevasa qualifies perfectly as a late Acheulian albeit with important component of flakes missing in them.

To sum up, we might note that the Lower Palaeolithic cultures in India can tentatively be accepted as emerging around early Upper Pleistocene. Even this late beginning surely was not universal for the whole sub-continent. Areas like Western zone, in this regard, might have been one of the areas of late colonization. Narmada, Krishna, Mahanadi and Burhabalang represent perhaps the most thickly populated regions in this sense. With regards to the cultural metamorphosis we have no doubt that the Abbevillian types are purely intruded within the Acheulians. We have more than one evidence of Late Acheulians without any Abbevillian indicators, and consequently the Abbevillian-Acheulian industries known from the secondary sites are definitely not representing a single stage of our Lower

Palaeolithic. The Acheulian tradition within our Lower Palaeolithic, therefore, has to be much younger in date than the Acheulian in France. A very conservative estimation for this should be anywhere between 100,000 to 60,000 years ago. Thus, to expect a kind of human evolution with cultural association in the line of Olduvai Gorge in India would not be entirely correct.





1. Novasian

For long time this specific stone age was not separately identified in India. The primary reason for this was our not having a specific stratigraphic context for it. Flakes of 5 cm-8 cm length, often finely retouched into tool types, have been discovered and recorded from as early as the beginning of this century. Around the second decade of twentieth century these started getting ascribed also as **Series II** tradition/culture. Thus, a typological category - **Series I** for core tools, **Series II** for flake tools and **Series III** for blade

yet it will be equally illogical to disregard the prolific evidence of Dhambeke II P 23 or for that matter the secondary sites from Andhra or Pushkar. These evidences clearly indicate that change of raw material is neither universal for India nor all that uniform in terms of the raw material chosen. The typological spectrum of Middle Palaeolithic for these diverse sites can be listed as follows:

1. Side Scrapers of a large variety of sub-types including convergent side scrapers (often prepared on levalloise flakes)
2. Rather sharp points with triangular cross-sections and a sturdy body. There are a few cases where these points are also bifacially worked. There are also isolated cases of tanged points known.
3. Fairly moderate frequency of borers with thick and sturdy body. Many of these specimens show such wide and open notches that Sankhata termed them as *scraper-cum-borer*. In addition to the above the following types may occur in some sites, but not all, and always in very insignificant frequency
4. Handaxes and cleavers
5. Choppers or chopping tools
6. Atypical end-scrapers
7. Burins and
8. Retouched blades.

The raw material in which the latter 5 types occur is invariably the same as that used for the main bulk of the industry.

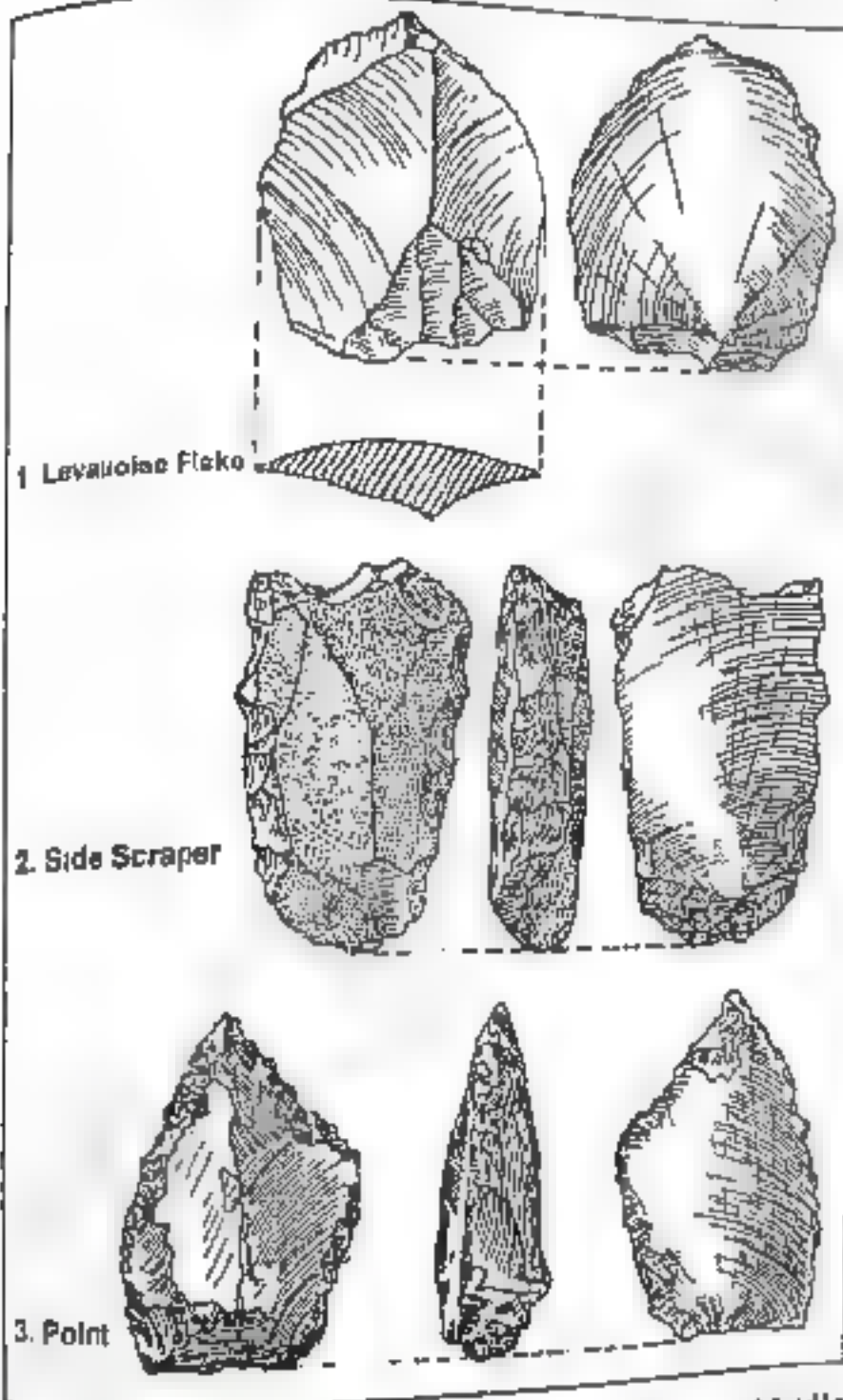
Middle Palaeolithic

If we can take a river-valley survey of the country we find that the western dry zone shows quite rich, although isolated, pockets of occupation during this period. Sites around Pushkar lake, or for that matter at Didwana, show no clear indication of these being purely Middle Palaeolithic occupation centers. Although the now extinct river Luni lies several kilometers south and south east of Didwana one cannot fail to note that an equally rich Middle Palaeolithic

occupation is recorded here as well. The credit of discovering both these two groups of sites goes to Bhandarkar.

The Lunburi industry is not only more varied in its typological content than the Nevala but also shows a very high quantity of repeatedly reworked flakes. The types recorded are convex and concave convex side scrapers, points of various types. In this, side choppers, handaxes, cleavers and edged blades. Upper Palaeolithic types such as retouched blades and blade cores are not very infrequent in this zone. Therefore in all probability, these represent a much younger variety than what has been recorded at Godavari or Narmada. The Nevala and northern Karnataka sites yield rather larger chunky Jasper of a number of shades with several typical Levallois flakes in form. The point of impact of almost all these flakes maintains pronounced positive bulbs of percussion indicating stone hammer technique as the principal technique of manufacture. The most predominant type among these is the side scraper. Borer form the next frequent type while points occur with a frequency of around 10 to 15 percent. Several of these are thin and leaf shaped and often carry a suggestion of shoulder formation near the butt-end. Abrupt retouching as also alternate retouchings are quite common.

In Andhra, Middle Palaeolithic is not known in as clear a stratigraphic context as in Maharashtra or Karnataka, neither is there as clear a break in the raw material as is observed in the western region. Commade was the first to make a large collection of series I tools from the district of Kurnool. Subsequently, Chittoor and Nalgonda districts were also systematically explored. Ramatirthampalle and Rajavagu on Krishna are two of the richer sites. The tools are prepared on fine grained quartzite and show extensive use of cylinder hammer technique. Many of these tools maintain pebble cortex and at times some are prepared on cores. There are several discs or round scrapers and elongated blades with burin edges prepared on them. Likewise, typical end scrapers are also prepared on such thick blades. It is significant that Levallois technique in these sites is not so frequent as in Nevala-Karnataka sites.



In Madhya Pradesh and Bundelkhand region the Middle Palaeolithic culture is perhaps best represented. Besides the main Narmada deposits, the Betwa, Shyva, Chambal and numerous other water courses in the general area have

yielded rich evidences of this cultural phase, Gonchi and Sihora on Betwa show palinated chert tools which include small handaxes, cleavers, choppers as also numerous retouched flakes and flake cores. The important types include side-scrapers of various kinds measuring 13 cm to 7 cm in length. Levalloise technique is well marked although not as much as in the western region. Bold retouching, often in an abrupt or semi-abrupt manner, is seen in the preparation of these types. Flakes are often flat and retouched bifacially. There are some burins also identified on these flakes.

Flake tools start occurring with the Acheulians but by about Middle Palaeolithic they start dominating the scene. In India all the European types have been found but they occur nearly 100,000 years later than in Europe and Africa.

As one moves into the Chhatisgarh region and finally into the Chhotanagpur forests the Middle Palaeolithic again tends to lose its identity and merge with the Upper Palaeolithic. Blade cores abound in these assemblages. Mohapatra has recorded Middle Palaeolithic from almost all the Orissa rivers and has shown how both pebble choppers and blade cores abound in them. Moving northwards across the Narmada into the Gangaic plain we find that Middle Palaeolithic, like the early Palaeolithic predecessor, had also colonized the Betwa valley in Allahabad district.

The nature and status of Middle Palaeolithic in India has not been adequately understood so far. This is primarily because a primary habitation site of this period is still eluding us. At **Bhedaghat** on Narmada near Jabalpur a classic section of Narmada has been exposed in recent flood. Sheila Mishra (1993) reports this.

The section reveals four distinct Quaternary phases, the lowest among these also yielded some Acheulian types. The layers yielding Middle Palaeolithic types had a date of 25,600 B.P. The Middle Palaeolithics are prepared on chert and include varieties of side scrapers besides medium sized cleaver made on chert. The solitary evidence of Bhimbetka right from the heartland of the Narmada zone, in fact, goes to show a classically Mousteroid industry developing right

from within an Upper Acheulian base. In this regard Bhimbetka seems perfectly logical within the process of the cultural evolution. But only a hundred kilometres away Shivna and the main Narmada valley, Middle Palaeolithic appears as completely exotic because of the complete change of raw material that heralds this new stone age. The Mousterian in Afghanistan and the Zagros mountains farther west seem to have many similarities with our desert zone Middle Palaeolithic and in this regard a chronological bracket from them would also be not very difficult to surmise. Bridgette Auchin speculates a period of 45,000 to 25,000 B.P. for them. For the rest of India it would be very difficult to explain a Middle Palaeolithic outside the preceding local cultural character. Maharashtra Karnataka adopts a proper levalloise based Middle Palaeolithic and hence comes closer to Mousteroid character. Even thin leaf-shaped tanged points are also known from these sites. Kurnool to Chhatisgarh, on the other hand, develop a Middle Palaeolithic which although quite effective, was entirely a local development. Narmada, by the very fact of maintaining two distinct varieties of Middle Palaeolithic (the Mousteroid variety without changing the raw material at Bhimbetka and the Shivna to Damoh variety with changed raw material but containing handaxes, cleavers), would tend to suggest that perhaps we are dealing with two different kinds of groups under this period. Those adapted to the arid zones or selected mountain abodes were the groups which developed Mousterian-like characters. In contrast to these an indigenous population was developing quite independently in the forested low-lands along large river courses. The entire Andhra Middle palaeolithic, or for that matter those from Orissa, can serve as the best example of this differential growth. The leaf shaped points or the emphasis on levalloise technique are no longer important. In fact borers increase tremendously in frequency while points become peripheral. The remarkable decrease of good points from the industry renders it a very benign look. In fact, it becomes difficult to visualize how these scraper and borer dominating tool-kit could be of any use for an actively hunting and gathering population. In this regard Sankalia seems to have a point when he

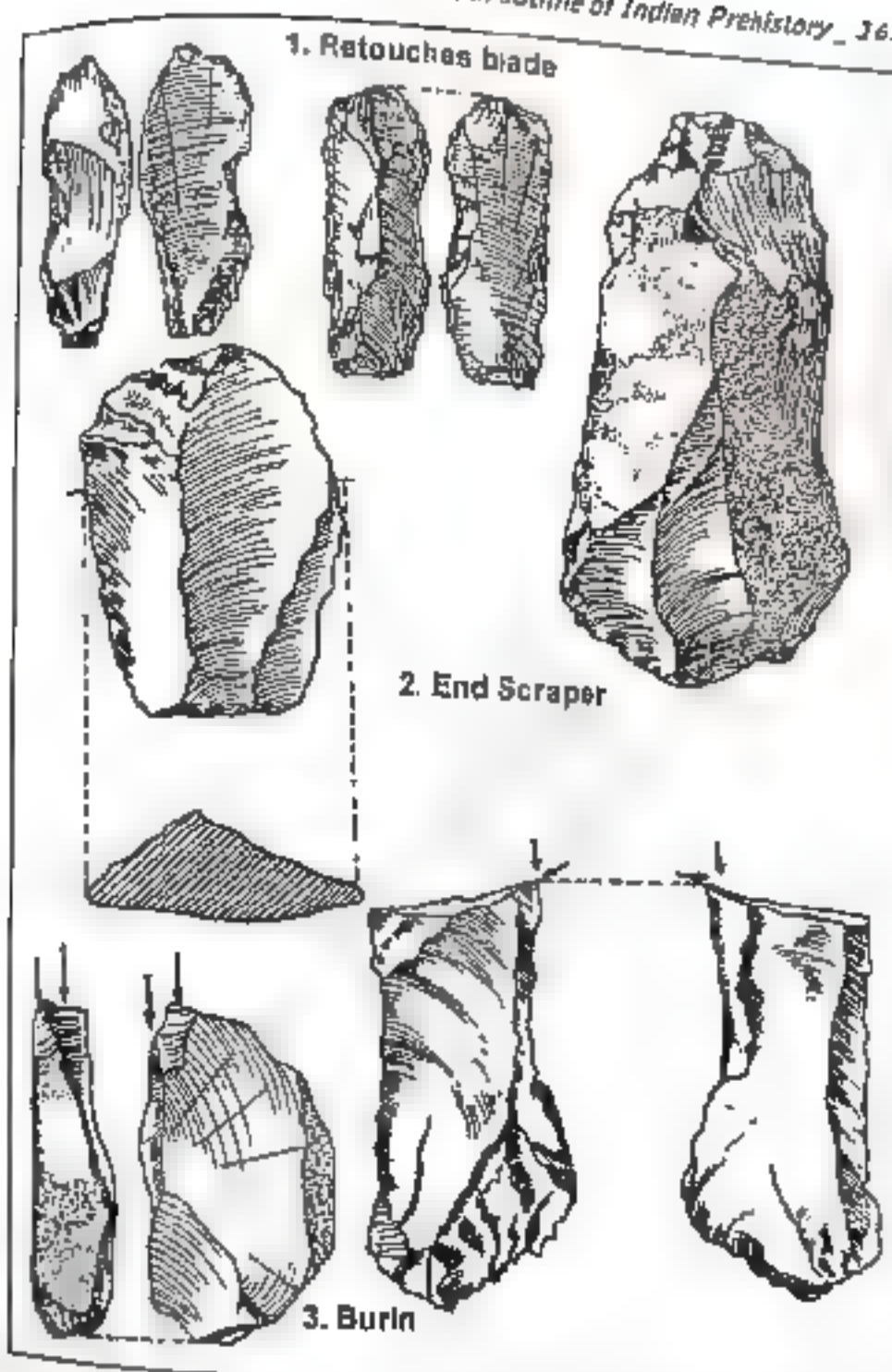
proposes that most of the Middle Palaeolithic industry in India was probably designed to shape ultimate weapons of hunting and trapping in wood, bone and antler.

3. Upper Palaeolithic

Upper Palaeolithic as a distinct cultural stage in India is still not comparable to what we would understand by this term in south west France, or for that matter *Ukraine*. It is essentially a typologically identified stage for most part of India. That is to say that except for the leaf points of Europe and Africa we have all the Upper Palaeolithic types of both Europe and Africa known from India. It is true that some type specializations like the *busque burins* or *Noailles burins* have still not been reported so far from this subcontinent but the profusion of worked blades, by no means, should be considered any less significant. The bone tools and art objects, which form a major characteristic of Upper Palaeolithic in Europe, are also more or less absent from India. In the face of this major missing character many scholars in the West and at home have been taking Indian Upper Palaeolithic claims with some doubt.

However, the claims that require serious consideration might be recorded in the following pages. To date the best evidence of a distinct Upper Palaeolithic comes from the site *Panigunta* in Chittoor district of Andhra Pradesh.

Panigunta. M. L. K. Murthy reported three-four localities along the river *Ralla Kalava*. These localities are called *Timmayyagunta*, *Venkanayanipalli*, *Chundi*, *Vellamheruva* and *Nallagundlu*. Of these the latter two localities yield Upper Palaeolithic mixed with Late Stone Age industry. A trial trench dug at *Nallagundlu* yielded 5073 artifacts from nearly 18 cm below the surface. Murthy argues that the Late Stone Age artifacts can be easily isolated because these are prepared on milky quartz while the Upper Palaeolithic types are prepared on fine grained olive green quartzite. The industry contains an overwhelming number of blades which at times attain length of as much as 10 cm. Many of these blades are 3 to 4 cm in breadth and nearly 2 cm in thickness. There is no doubt, therefore, that here we are dealing with a culture



which is entirely based on blade tool manufacture. The types identified by Murthy are :

Burins (16 p.c.)

Awls (4 p.c.)

Backed Blades (67 p.c.)

Points (2 p.c.)

Scrapers (8 p.c.)

Choppers (3 p.c.)

Upper Palaeolithic is a very late phenomenon in India. But the types known show very little change from what has been established as Upper Palaeolithic types elsewhere.

The illustrations of the tools leave no doubt that the Renigunta industry is more akin to the generalized East-Gravettian of Central Europe and hence should not be compared with the rather early and also specialized French Aurignacian.

4. Muchchatla Chintamani Gavi

In district Kurnool of Andhra Pradesh a cave site with the above name was excavated by Murray subsequent to his discovery of Renigunta. It became immediately famous because here, for the first time, Upper Palaeolithic with a bone tool component could be demonstrated from a primary context. The lithic industry comprised of only 9.70 percent while the bone industry formed nearly 90.30 percent. Most of the blades are not retouched except 5 side-scrapers, 1 burin and 4 retouched flakes identified. The bone implements are identified as scrapers, perforators, chisels, scoops, shouldered points, barbs and spatulae. Of these shouldered points form the highest frequency (18 p.c.). The animals identified from the bones are *Presbytis entellus*, *Viverra* sp., *Felix* sp., *Hystrix* sp., *Equus* sp., *Equus asinus*, *Cervus* sp., *Roselephas* sp., *Bos* sp., *Budalus* sp., *Antelope* sp., and *Gazella* sp. Sankalia feels that many of these bones show the evidence of **Groove and Splinter** technique.

Bhimbetka

These caves and rock-shelters from Raichur district of Madhya Pradesh have already been discussed in our Lower Palaeolithic consideration. The excavation in the cave number III F-23 yielded a deposit between the Middle Palaeolithic and the Mesolithic which is distinctly Upper Palaeolithic in its character. A proper typological analysis of this industry is not complete, hence nothing more (beyond this fact that these are a 6 to 10 cm long blade based industry) can be recorded at the moment. The usually illustrated types include 4 x 8 cm broad blade end-scrapers, burins and backed blades (Micro-Gravette Points).

5. Belan Valley and Baghor II

Belan is the small river in district Allahabad in Uttar Pradesh which receives maximum attention from G. R. Sharma and his other team mates. There are many other such small rivers like Son or Koel which rise in the eastern Vindhya and flow into the Gangetic system. A large number of Upper Palaeolithic finds have been collected from these rivers from the days of Cockburn but Belan was excavated at Bahori and Jagdaha in 1965 through a cliff section of nearly 18 metres. There was also a radio-carbon date available for the Upper Palaeolithic layer from this excavation. This was 17,000 B.P.

Recently a joint exploration was undertaken by G. R. Sharma and J. Desmond Clark in an area between river Son and the Ramgarh escarpment.

Four major alluvial and three wide spread loess depositions were mapped along Son as well as Belan valley.

Sihawal formation was identified as the oldest Quarternary formation formed by a conglomerate of colluvial/alluvial cobbles within a gray clay matrix. Lower Palaeolithic Acheulian handaxes have been found in this group.

Patpara formation is a loessic clay formation overlying the Sihawal. The artefacts collected from this level has been described as 'final Acheulian' or 'Acheulian' of Mousterian tradition' finally giving place to Middle Palaeolithic being slightly above. There is a TL date for this deposit and it is recorded as $103,800 \pm 19,800$ B.P. The tools are not adequately discussed.

Baghor formation. Close to the stream courses two depositions have been identified. The lower one is a carbonised cemented gravel and coarse sand. This layer yields many fossil fauna. The upper component is a layer of fine silt and clay. The lower one contains Middle Palaeolithic artefacts and the upper one yields Upper Palaeolithic tools. Baghor loess with Upper Palaeolithic blades have been dated to approximately 26000 B.P. Some Epi-Palaeolithic artefacts are reported from the upper four meters of this formation and this has a date of 12,000 to 10,000 B.P.

Khataunli formation. This is the youngest formation in this region and has a date of C.3000 to 4000 B P. It consists of gravels, sand and clay and contains Neolithic pot-sherds and microlithic blades.

Baghor formation has yielded more than one area or locality. At Baghor-I, the excavation revealed in-situ remains of macro and micro blades, prismatic cores, backed and truncated blades and bladelets, shouldered blades, denticulated blades, large scalene Triangles and perçoirs (borers). A small artificial stone structure uncovered in the excavation has been described as a shrine. The shrine is a circular platform of sand stone blocks in the centre of which is a natural concretion having a series of concentric triangles etched by weathering. Similar stones are still used today in the local folk worships in the adjoining villages. These are worshipped as symbols of mother goddess. The site is spread over an area of 200 sq. meters and is about 10 cm in depth. This is taken to indicate a very temporary occupation.



Mesolithic

General Consideration

Mesolithic period in human cultural history is defined as the earliest Holocene culture that occurs before agriculture was started. Microlithic blades detached by pressure flaking from cylindrical cores are used to make tool types. We have some evidences, albeit from outside India, that these blades were mounted in combination on suitable handles to form various kinds of tools which could be used. Agriculture does not begin everywhere at the same time and hence Mesolithic period also expands or shrinks in a country depending on how late or

early agriculture begins. Microliths normally range from 1 cm to 6 cm in length and since they are detached by pressure flaking technique they can seldom be more than 1.5 cm in breadth. Of course these measurements are given only to form an idea about the general size of the tools found from this period. Since microliths show a basic principle of shedding mass drastically, it is not illogical to believe that missiles might have resulted as a logical end of this technology. Thus, the invention of bows and arrows is usually attributed to this phase. We have many prehistoric cave painting as well, to prove this point.

In India, microliths occur from the earliest period of Holocene and continue to occur almost with iron age. In isolated pockets even contemporary simple societies, on specific occasions, are known to be using the same microliths prepared by same technique. There are instances where second World War bottles, when chances into tribal areas, are known to have been used to prepare microliths. It is, therefore, not difficult to imagine how complex it can be for a theoretician to define and isolate Mesolithic cultural stage for India. One of the general views held for the evolution of microliths is that what is known as 'fishing and fowling' must have replaced the cultures adapted to large mammal hunting. But along with this, grass seeds in the wild must have been collected in available and suitable exposed patches within the decreasing forest covers. There are numerous examples of these purely hunter and gatherer groups continuing with change in their economy when a fissioned group from within the large band has chosen to settle down into Neolithic villages. In order to understand these purely pre-agricultural stages of culture, it will be important to look at the actual sites discovered till date. It is important, at this juncture, to remember that microliths in terms of technomorphology are a logical derivative of the Upper Palaeolithic, and hence are perfectly suited as a successor of the same in Europe. In India, in the absence of widespread evidence of Upper Palaeolithic, most of the microliths had been traced as having entered from the west in the past. In the light of recent discoveries from India it would seem that a microlithic typology evolving out of our

Mesolithic Palaeolithic is not difficult to visualize. Further, the mesolithic west of India in Pakistan also do not seem to be as prolific as Upper Palaeolithic as to a proper definition the theory of Jammu Gudi near Poonawar, Kalat and Quetta areas near Rawalpindi and Thar in India have yielded some mesolithic but by no means enough to show that this area could act as a corridor from Europe into India.

2. West

Proceeding from this area one faces the Thar desert as one enters India. Tilwara in western Rajasthan is the westernmost Mesolithic site of India and lies almost at the fringe of the desert in Barmer District. V. N. Misra excavated the site in 1971 and reported two distinct phases. Of these the earlier phase would appear to be more clearly a Mesolithic settlement. The younger phase yields bits of iron, glass beads and several wheel-made pottery. Circular arrangements of stones on the ground indicate habitation structures. Fire hearths, charred bones and other habitation debris clearly indicate a late desert settlement of Mesolithic culture. Trapeze, lunates, points besides numerous parallel-sided blades and fluted cores form the industry. Bagor, discovered and excavated by Misra in 1967 seems to show a farther extension of the same cultural pattern. It is a prominent sand dune on the river Kothari (a tributary of Banas) near the town of Bhilwara. A deposit of 1.5 m. was excavated and within it three distinct cultural phases could be identified. Of these the earliest, i.e., phase I occupies a depth up to 50-80 cm. It shows profusion of animal remains and microliths. Phase I had a radio-carbon bracket of 5000-2800 B.C. Phase II (2800-600 B.C.) yields copper tools and pottery in addition to the microliths. Phase III (600 B.C. - 200 A.D.) yields some iron implements besides several wheel-made potsherds.

The Mesolithic phase at Bagor has yielded very rich cultural material, including stone paved habitation floors, numerous bones of wild species and human burials besides some tiny pieces of hand made potsherds. The lithic repertoire at Bagor is perhaps one of the richest in the world. Several thousand microliths have been recovered.

from this level and these are perhaps the finest of microliths so far known from India. Majority of these measure between 2 cm to 1.5 cm, and there are quite a few which are even smaller-measuring between 1 cm to 0.5 cm. The types finished on them are

- i) Thin blades with flat retouchings
- ii) Blunted back blades
- iii) Obliquely truncated blades
- iv) Obliquely truncated with lateral backing
- v) Triangles which mainly include scalences
- vi) Trapezes
- vii) Broad trapezoids or transverse arrow heads
- viii) Crescents and
- ix) Points of blades

Flake types such as scrapers or burins are totally absent in this industry. Likewise the crest guiding blades which otherwise are quite common in most of the known microlithic industries in India are also conspicuously absent in Bagor. The faunal discovery also is very revealing. Out of the total faunal recovery at Bagor, 72 percent comes from Phase I and then there is a sharp decline. In Phase II only 19 percent of the total fauna occurs, and in Phase III only 3 percent of the total fauna occurs. The animals identified are claimed to indicate almost 80 percent domesticated species and include sheep/goat, buffalo, humped cattle, pig, black buck, chinkara, chital, sambhar, hare, fox and mongoose. These even include some aquatic fauna like tortoise and fish.

In all, five burials form the other interesting feature of the site. Of these one burial is attributed to the Phase I occupational culture, three burial to Phase II and one to Phase III occupation. The Mesolithic burial was laid in extended position with the lower left arm resting over the body. The head was oriented towards the west. The burials in the subsequent phases show a complete change. The bodies are laid in flexed position (arms and legs folded like in a sleeping position) with the head oriented towards the

east. Unlike in Phase I these burials contain large number of grave goods like earthen vessels, ornaments, metal objects and an iron food. The famous hollow based copper arrow heads, with a pair of holes driven through the barbs, also come as grave goods. In the sequel it must be said that Bagor occupation can not be visualized in isolation. It must have been repeatedly occurred until as late as the medieval period, otherwise it would not have earned the local name of Mahant mound. The Mesolithic occupation, however, shows clearly a hunting emphasis which may have also maintained a suitable number of semidomesticated animals in the area. The occurrence of stone paving on habitation floor would show an almost sedentary nature of the occupation.

Langhnaj

In Mehsana district of Gujarat, only a few hundred kilometers south of Bagor, occur several consolidated sand dunes along the western bank of the river Sabarmati. Sankalia recorded many microlithic sites and excavated Akhij, Valasara, Harpur and Langhna. Later, Subbarao has listed more than 80 such sites extending as far south as almost the northern border of Maharashtra. Langhnaj among these has received maximum attention. Several seasons of excavation conducted till 1963 were able to cover about 12,800 square feet and go upto a depth of 8 feet. Sankalia initially identified two main layers, the top 3 feet is dark brown in colour while the lower layer is light brown and merges with a kankary deposit which is full of lime nodules. Three distinct cultural phases were identified. Of these the earliest phase, Phase I, produced microliths and burials besides animal bones and some crude pot-sherds in addition to the microliths. A tanged iron arrow head, a stone bead and some fragments of stone querns are the other cultural materials from this phase. There is only one radiocarbon date available for both Phase I and II and it is estimated as 2040 ± 110 B.C. A large amount of microliths were collected from the excavation but more than 90 percent of these are waste material, cores and chips. Even parallel-sided blades form only 4.67 percent. The finished types are blunted back blades, lunates, serrated blades,

trapezes, scrapers, borers, notched flakes and burins. Associated with the microliths occurs a soft haematite pebble with smooth rubbed surfaces, a rhinoceros shoulder blade with marks of striations and several hammer stones.

14 human skeletons have been found buried in a flexed position. In some cases legs were folded backwards and tied before interment. The repeated finding of cut on the forehead led some experts to believe that they were probably cannibals. Various species identified from the faunal recovery are wild boar, nilgai, many species of deer, black buck, cattle, buffalo, rhinoceros, and some burrowing forms. The radiocarbon date of 2000 B.C. for a hunting-gathering community within 100-200 km distance from a well known Harappan settlement makes Langhnaj a very clear indicator of the fact that these communities might have survived with their primitive economy while being in symbiotic relationship with the neighbouring urban cultures. Honey and hunted meat along with the hide might have been much sought after in the urban communities. It is surprising how the hunters did not trade their produce for metal tools but may have got cereals only in exchange. Perhaps this explains the presence of some of the fragmented food processing pieces like grinder etc. at Langhnaj. The morals for archaeologists from Langhnaj are many fold but not demonstrative. But as anthropologists it will be wrong for us not to take cognizance of them.

i) Langhnaj proves that the cut and dried cultural chronologies that we are fond of constructing can be seriously misleading; i.e. Harappa should occur after the whole range of Palaeolithic, Mesolithic and Neolithic are altogether over. But in reality we find a pure Mesolithic occurring with the Harappans.

ii) Metals, their extraction and processing was held with either utter secrecy or was tied with a network of symbolic belief structure which made their trading beyond consideration.

iii) A simple hunting-gathering society in the neighbourhood of a rising urban civilization is not only an important requirement but can often play a determining role. A logical

extension of this argument will be that it is very important for urban civilization to keep the neighbouring simple economies from evolving into cultures based on more efficient economy.

iv) A hunter gatherer has his own symbolic world to fall back upon to explain his own technology until a time he is capable of organizing a larger group of individuals in order to internalize the need of intensifying his economy. The need of a technological evolution occurs at this point.

The evidence from all the three phases (the last one with iron) of Langhna, and Bagor leaves no doubt that such a transformation had never occurred among these dune dwellers of western India.

3. Central Area

The area which includes Madhya Pradesh along with its extension in Uttar Pradesh provides another region of Mesolithic occupation of considerable importance in India. Here, unlike the Western Zone there are many instances of Mesolithic occupations occurring vertically above Palaeolithic habitations.

These provide an insight into the fact that the hunting niche is not substantially changed from the Palaeolithic phase. May be now only selected species were intensively exploited. But, here again, the faunal evidences are not very helpful in identifying these species. Probably sheep/goat comes closest to being numerically abundant on a very general estimate.

Bhimbetka

At this site there are many rock-shelters which yield microliths in the floor and paintings on the walls and the ceilings. At III F 23 the microlithic horizon starts with a rich geometric industry (if a microlithic occurrence contains triangles and trapezes it is considered geometric and is believed to be younger than the non-geometric industries) but does not contain any pot sherds. The next group contains painted wheel made pottery and copper objects and hence can not be considered Mesolithic. The microlithic horizon is believed to be roughly at 5000 B.C. date and

contains a number of human burials as well. The burials are extremely fragmented and show medium range characters unlike those at Bager. It is important to note that at Bhimbetka the shift of raw material to chert occurs first in the Mesolithic level. The microliths are much larger in size and it is quite usual to get 3-4 cm long slender lunates besides numerous fluted cores and parallel-sided blades. There is a suggestion that during this period possibly there was an attempt of building a screen or wall by piling stones up to a height of about 3 feet near the mouth of the cave towards the side wall.

Adamgarh

At these rock shelters and immediately outside some shelters nearly 18 trenches were dug. Microliths have been uncovered in almost all of them within first 150 cm. The top 20-60 cm of course is usually sterile and constitutes of rock debris and soil. Lower layers yield Palaeoliths of a large variety of types that we have mentioned earlier. What is interesting about the Adamgarh microliths is that they are constantly associated with pottery fragments and rich animal remains. At least 14 different animal species have been identified of which dog, buffalo, sheep/goat and pig are declared as being domesticated. The two radio-carbon dates available from this layer are 895 ± 105 B.C. and 5500 ± 130 B.C.

Both these dates are incongruous if we have to accept Adamgarh microliths as representing an early Neolithic economy. In terms of tool types identified we have blades, lunates, obliquely blunted knives along with triangles and trapezes. But we also have such flake types as side scrapers, borers, points and occasionally burins prepared in exhausted cores. Although more crudely finished than Langhnaj, chronologically, Adamgarh would seem to fit with the Gujarat group rather than being the earliest Neolithic of this zone.

Sarai Nahar Rai Group

Mirzapur district forms the last Vindhyan limits before one proceeds further north to enter the Gangetic valley. Several rock-shelters with paintings, presumably attributable to the

Mesolithic culture, have been recorded as early as the end of the last century. Some of these rock shelters and adjoining alluvial sites have been discovered in the early part of this century and are today well known in all books of Indian archaeology. We will now briefly introduce the names here.

Morhana Pahar is a rock shelter and is about 7 km south-west of the town of Mirzapur. A small scale excavation yielded more than one layer of occupation. Microliths form the most predominant antiquity in both these layers. In the younger layer, however, pot-sherds are also known to accompany. The usual types described are lance, point, trapeze and burins.

Baghai khor is situated in the Morhana Pahar region of Mirzapur district. The excavation yielded microliths with pot-sherds.

Lekhania is a rock shelter which has yielded rich prehistoric antiquities both within as also in the adjoining the rock shelters. The picture of the Mesolithic here is not much different. Microliths of both geometric and non-geometric varieties occur in association of pot-sherds. In addition to these bone tools, beads and a broken ring stone form some additional important finds.

Chopani Mando is an open air alluvial site on the river Belan and is about 70 km south-east of Allahabad. Here 3 different phases of Mesolithic is described. These are named Early Mesolithic (A), Early Mesolithic (B) and Advanced Mesolithic or proto-Neolithic. The usual tool types recorded in these three phases do not differ in any significant manner. Side scrapers, burins, points, borers, backed blades, retouched blades and other microlithic types like Lunates, trapezes and triangles form the usual spectrum. In Early Mesolithic (B) these are accompanied with burnt clay bumpy, animal bones, hammer stones, anvils and sling balls. On the floor of this phase four circular hut foundations are also described.

Ghagharia Rock-shelter I. This is a rock-shelter a little south of the above cluster of sites. It is in the district of Sidhi located on the Kaimur ranges facing the river Son. The

ceiling and walls of the rock shelter contain paintings which broadly compare with the central zone Mesolithic paintings.

Dam dama is in Pratapgarh district of U.P., not very far away from another important occurrence at **Mahadaha**. A number of successive phases are exposed in the excavation and these have been taken to demonstrate a slow rise of Mesolithic culture in this zone. From different layers of the site a good number of journals as well as skeletal remains were found. Besides large quantities of microliths, burnt clay lumps, charred animal bones and hearths are recorded from the principal phase. The microliths are described as 'pre-pottery' and 'geometric'. The main types described are blade fragments, cores, backed blades, truncated blades, scalene and isosceles triangles, trapezoid, trapeze, lunate, perfor (borer), drill, arrow head, side and end scrapers. In addition to these several bone objects are also recorded from this phase. These include pendants, bangles and fragments. Besides these querns, mullers, anvils and other stone fragments are also recorded. A large number of charred and semi-charred bones have been identified as belonging to cattle, goat, stag, deer etc.

In the Allahabad-Pratapgarh region several horse-shoe lakes seem to have been created during the early post-Pleistocene period. Apparently the region is formed by the early alluvial spread of the Ganga and the various streams from south which meet the Ganga. The largest site amongst them is called Sarai Nahar Rai. It is estimated that the habitation at the site extends over 2000 sq. mt. This seems to be a single occupation site similar to Mahadaha and Dam Dama found in the contiguous region. The excavation uncovered a living floor of 5 x 4 mt with four post holes on the four corners. The floor is made of burnt clay lumps and has several fire hearths—some with charred bones near them. Faunal types identified include sheep/goat, buffalo, cattle, elephant and tortoise. Many amongst these are also suspected to be of domesticated type. 13 human burials in extended form with head towards the west form one of the most important features of this excavation. In one of these a microlith was found pierced in the rib. A total number of 168 microliths are reported but all of these

are not found in association with the habitation debris. Instead, most of these are collected from the surface. The types identified and their relative frequencies are as follows.

Blade	27.97	Point	17.86
Triangle	11.90	Trapeze	4.17
Lunate	16.67	Crescent	2.39
Burin	4.17	Borer	1.78
Piercer	5.36	Arrow head	4.76
Utilized flake	2.98		

Although there is some problem about the types and their identification, there should be no doubt that here we are dealing with a geometric industry which also maintains several flake tool types.

In association with the burials occurs a pot which is round, ill-fired and coil structured. There are a series of radio-carbon dated available and most of them being on uncharred bones could not be very reliable. The oldest of them is $10,345 \pm 110$ B.P. which make it 8395 B.C. On the basis of some of the younger dated being more consistent Agrawal claims that the site should be more logically 1000 B.C. only. It is true that the cultural indicators would seem to put the early Holocene as improbable but at the same time a 1000 B.C. date (which incidentally almost marks the period of the arrival of iron in the Gangetic plain) would also seem to be pushing it too far.

4. Eastern Area

The area covering most of southern Bihar, Orissa, and West Bengal, otherwise identified by us as Chhotanagpur region, has thousands of reported as also so far unreported microlithic occurrences. None of these has any excavation report except from Kuchai in Orissa and Birbhanpur in West Bengal. Most of these microliths are fairly large in size and are occasionally prepared on black chlorite stone or even fossil wood. Geometric forms are either absent or rare in most of the cases and constitute blades, lunates or points along with burins or side-and-end-scrapers on fluted cores and flakes.

At Kachal a micro of this horizon without any ceramics was reported from the levels between Neolithic horizon and Isthmian. There are no very far from areas such as Lower Palaeolithic as well as Upper Palaeolithic and Palaeolithic microoliths have often been found in association with Black and Red ware pottery, flint stones or at least even from a flint.

Birbhanpur is a site near Durgapur railway station and is situated on the bank of the river Damodar. It was excavated by D. B. Lal in 1957. Over the basal decayed sandstone is a thick layer of mottled silty sand which is believed to be caused by the in situ weathering of the underlying rock. This is capped by a lateritic gravel. Microoliths occur on the top of this layer. This is further covered by about 60 cm of sandy earth of light brown colour. Geomorphological studies were done of these soil layers and on the basis of them it was argued that the lateritic gravel bed perhaps marks the last of the wet spasm during the close of Pleistocene. Thus it was argued that the implementiferous layer was caused during the increasing aridity of the early Holocene. Some post holes were also claimed to have been discovered but no hearth, bones or human burials could be found. Typologically the Birbhanpur industry seems more archaic as big flake and blade tools dominate it. Almost 40 percent of the total industry is composed of scrapers, borers and burins taken together. Lunates form the main micro lithic type and triangles and trapezes are conspicuous by their absence.

6. Southern area

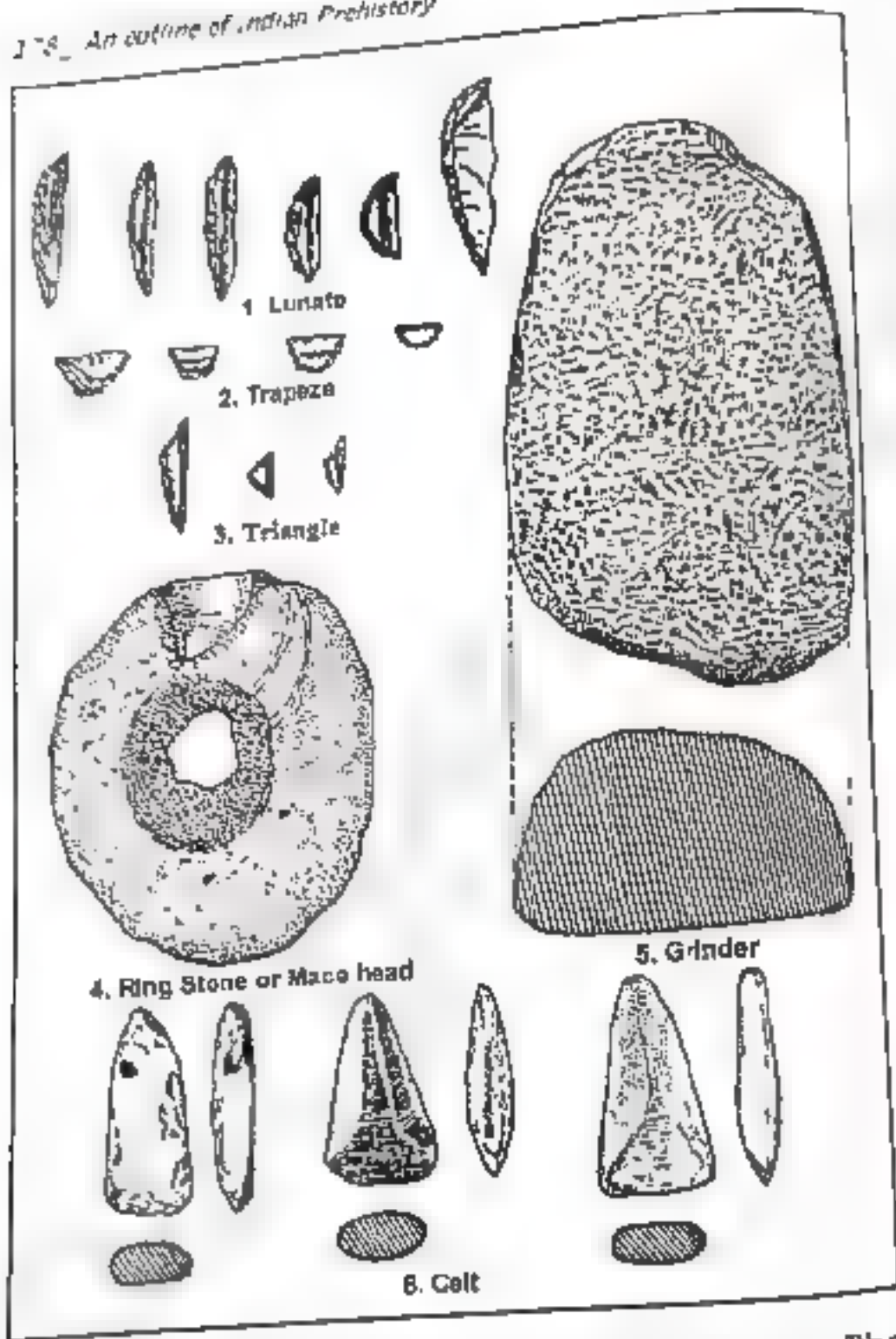
One of the biggest concentrations of micro lithic occurrence from this zone is known from Karnataka. Just between Krishna and Bhima rivers in Shorapur Doab alone 25 micro lithic sites are reported by Paddayya. Tools recovered and analysed from these sites are more than 10 thousand in number. These microoliths are extremely slender and long. Mostly these are flat with hair thin lateral retouchings. Those with triangular section are often retouched abruptly and compare well with the micro-gravette points of Epipalaeolithic of Europe. Crescents, borers and burins are the other usual types. Triangles and trapezes are either totally absent or insignificantly known.

Sangankallu in Bellary district has been known as a famous prehistoric site since the beginning of this century. Subbarao excavated this site in 1949. In 1965-66 Sankaha undertook a small-scale fresh excavation on the foot of the hill. Since the Neolithic in this region is dated around 2500 B.C., the microlithic group is estimated around 3500 B.C. These microliths from the pre-Neolithic layers are essentially composed of flakes, both utilized and retouched. Blades are surprisingly not reported at all from this layer although there are many lunates identified.

Teri

A group of 11 sites of microlithic clusters occurs along the fossilized sand dunes in the Tirunelveli district of Tamil Nadu. These are usually referred to as Teri sites. It is believed that older transgressions of the sea had caused the formation of these sand dunes. It is argued by Zeuner that the sea used to have a height of more than 7 metres than the present sea level during the early Holocene and during the succeeding regression dunes at three respective levels were created nearly as far as 10 km inland from the present day coast. One of the transgression beaches has also been dated by radiometric technique to nearly 5000 B.C. Microlithic occupation took place once these dunes were in the process of consolidation. Microliths from this area were first recovered by Foote. Subsequently Aiyappan made a substantial collection from one of these sites called Sawyepuram. Finally Zeuner made a detailed report of these sites.

The industry is prepared on chalcedony, quartz and fossil wood and shows one of the most primitive features in typological sense. Disc or discoid cores, flakes shaped into various kinds of points, side scrapers, thumb nail scrapers and borers, besides burins form the majority of the industry. Lunates prepared on flakes and points and arrow heads prepared by bifacial pressure flaking are some of the other significant features of this site. Microlithic types include lunates, backed blades and pen knives besides numerous blades and fluted cores. It has been argued that the Teri industry shows closeness to Sri Lanka microliths in several significant features—especially in the tradition of



preparing bifacially pressure flaked points. The Bandarawela factory site in Sri Lanka in this regard is specially mentioned.

It can be seen from the above that a pure microlithic survey of India would seem to indicate a widespread tradition of

this lithic technology. It is a different matter whether all these can be counted to form a picture of Mesolithic India or not. A true Mesolithic phase in India is clearly demonstrable in Central and Western zone besides at Teri but each one of them has its own individuality. With increase of aridity, forest covers opened up and grassland expanded in certain areas (Birbhanpur, Teri, Sarai-Nahar Rai) and here the adaptation strategies show quite different direction of development. In contrast to Langhnaj, on the one hand, at Bagor and Tilwara one can see the examples of quite specialized variety of adaptation. Adamgarh and Bhimbetka might be as late as Langhnaj but emphasis on animal domestication in this region can not go entirely unnoticed. In all probability South India had an entirely independent development of microliths and hence forming its own regional characteristics.

Numerous rock paintings studied from this period show the emphasis of fishing, honey collecting, net trapping and similar small-game-based economy. Inter-group warfare is empirically demonstrated in the Sarai-Nahar-Rai skeleton but rock paintings also, in some instances, show the factor of human aggression having evolved during this phase. Wild seed collection and partial sedentism seem to be also indirectly indicative from the various archaeological evidences from some of these sites. In short, a stage was almost being set for man to enter into the settled and productive economy.

Mesolithic and Neolithic are fairly overlapping in both typological as also chronological sense. Nos. 1-3 are Mesolithic and 4-6 are Neolithic.



Neolithic



1. General Considerations

As the youngest period of stone age history of man Neolithic has always been understood as a well defined stage. It is not surprising, therefore, that antiquities were sought merely to fill the grand definitional frame till as late as 1959 in India. Pre-defined types usually referred to as celts whenever found, no matter even if from surface, were taken to locate a Neolithic site. The usual technomorphological analysis of these types formed the ultimate understanding in the culture. This was more or less similar to the

methodological basis used for the preceding periods in prehistory.

Around 6000 B.C. numerous sites in West Asia started showing certain features which soon got identified as discriminant characters for Neolithic. These features can be briefly summarized as follows:

- I. Man becomes sedentary in nature and hence develops interpersonal relationships to consolidate a form of cooperative existence. Thus, the social organization has to, by necessity, become more complex than earlier.
- II. This change, it is argued, becomes necessary because of a change of economy. This change in economy is taken to be caused by man getting induced because of adopting agriculture.
- III. Since agriculture involves two entirely new areas of interaction with the natural environment, the media (artifact) through which these interactions are accomplished are counted as Neolithic attributes. These attributes are:
 - a) Large areas of vegetation cover had to be cut and a field for cultivation had to be tilled. It is believed that the Neolithic celt was evolved to meet this new interaction. A hard and compact rock is selected and **flaked** into an axe or adze. Then the sharp edges of the intersection of flake scars are knocked off in the manner of **pecking**. Finally, the tool is rubbed on a hard rock with water and sand, so that a metal-like smooth and sharp axe results. This final step is referred to as **'grinding and polishing'** technique.
 - b) If cultivation is to be accepted as a gainful economy, it requires storing of the harvest for regularity and security of supply. Thus, management of land and also its produce suddenly become a very pivotal issue for establishing the new economy. Fire burnt earthen pots are believed to have evolved at this stage in order to fulfill the primary advantage of the economy.

It is not surprising, therefore, that archaeologically speaking, ground celts, pot-sherds or permanent dwelling

structures, either individually or together, whenever found are taken to indicate a Neolithic culture. The large number of Neolithic finds, that various archaeological exploration till 1950 have yielded, were given a regional treatment for the first time by V D Krishnaswami in 1959. He divided Indian Neolithic culture into four geographical zones purely on the basis of archaeological features like the techno-morphological characters of the celts, microliths or ceramics. The zones identified are,

- (a) *The Northern zone:* In which Krishnaswami could include the then known only site from Kashmir called Burzahom.
- (b) *The Eastern zone:* Till then this zone was identified only on the basis of surface-collected celts from Bihar, Orissa, West Bengal and Assam.
- (c) *Central and Western zone:* The Malwa region and northern Maharashtra had some excavated sites till then and these were included in this zone.
- (d) *Southern zone:* Till the time of Krishnaswami's work both Brahmagiri and Sangankallu were excavated. These, along with Pirkhal and other known sites, were included in this zone.

In brief, this zonal analysis attempted to show that the northern zone was characterized by pit-dwelling and pointed-butt celts, the eastern zone by varieties of shouldered celts, the central and western zone by microliths and pot sherds more often than celts and finally the southern zone by celts which often have broad butt-end.

Sankalia, who was himself involved in archaeological research in the last two zones, had rich first-hand information of the Neolithic and Chalcolithic sites from northern Maharashtra and Karnataka. On the basis of this knowledge Sankalia in 1962 took the liberty for the first time to claim that in India we have a large majority of sites which do not fit in within either a pure Neolithic or a pure Chalcolithic picture and hence these could be identified as Neo-Chalcolithic sites. Most of the sites Krishnaswami had counted within his c and d zones were now re-classified by

Sankalia as Neo-Chalcolithic. Sankalia classifies the Indian Neolithic as follows:

(A) Pure Neolithic

1. This included the whole of eastern India comprising Assam, Bihar and Bengal. These are characterized by ground axes with shoulders and very little pottery.
2. This included the Kashmir sites. These are characterized by ground axes, bone tools, pottery and pitdwelling.

(B) Neo-Chalcolithic

1. South India comprising western Andhra, Karnataka and Tamil Nadu. The main characters of these sites include ground stone tools, microlithic blades, handmade pottery and round huts on hilly terraces. Most of these sites also include one or two pieces of metal.
2. Early Baluchi cultures, e.g. Kili Ghul Mohammad which show much developed habitational structures and ceramics- often wheel made. Ring-stones, saddle and quern, and celts are found in plenty.
3. The site of Bagor in Bhilwara is counted as forming a separate Neo-Chalcolithic group. Microliths, copper arrow-head, pottery and huts with wooden posts characterize this site.

It will not be difficult to appreciate that the real problems of Neolithic India have not been adequately understood in most of these attempts. Even if we go by the attribute analysis that is usually done we cannot fail to notice one very significant point. That is, while almost all the Neolithic sites in India known till date go at the most to a date of 2500 B.C., Harappan culture which is not only Chalcolithic but a well developed urban metropolis starts around the same date. To any archaeologist tuned to the system of cultural chronography this peculiar situation in India, specially in view of the numerous evidences of 8000 B.C. to 6000 B.C. Neolithic sites from both the western and eastern gateways of the country, would simply mean that we are yet to discover our pre-Chalcolithic phase of Neolithic for majority.

of the region of the country. We, as anthropologists, also cannot deny the possibility of a future discovery but surely what has been discovered so far needs an adequate explanation.

Here we need to delve into the theories of social formation. If we concede the fact that agriculture is totally labour intensive economy, one can not visualize this transformation merely with the adoption of technology. Labour management with adequate consolidation of the relation of production, in that case will become a much more important determinant than technology. We have claims of domesticated seeds from as early as Upper Palaeolithic from Israel but still we do not have a Neolithic culture developing with these seeds. Similarly axes are known from Maglamoirian and Campignian (both Mesolithic of North Europe). Yet these areas were the last to adopt Neolithic. Again, ceramics are known to have been developed much earlier in Japan than the emergence of Neolithic there. In other words we have to concede a stage of varying duration which Julian Steward had visualized as a stage of incipient farming. Incipient farming has to be conceived as a reasonably sedentary group taking to low labour force oriented farming conjoined with husbandry or hunting depending on the ecological potentiality of the regions of adaptation. Most of the labour management in such a case has to be kinship based. Even then, a fluidity as also mobility of the community must have been a regular feature to avoid exhaustion of resources. In this transformation the factor of demography too can not be neglected. It is a possibility that whenever demographic pressure increased within a less hospitable ecology the rate of transformation to full blooded Neolithic was accelerated. For most of India, therefore, we have to accept that such a transformation was actually much retarded primarily because of a lack of demographic pressure or ecological pressure or both. It is important at this point to emphasize that all evidences from Indian Neolithic would tend to indicate that:

It is not technology transforming the super structure but the other way round as far as majority of Neolithic evidences from this sub-continent go.

2. Borderland evidences

A study of Indian Neolithic period needs to be preceded by a hurried survey of the two borders which during historical period have acted as the main corridors of human migrations. The western border is formed by the largest district of Pakistan called Baluchistan and parts of eastern Afghanistan. This area is known for its extreme climate and scanty rain fall, yet a large number of Neolithic sites with pastoral base are known to have developed in this region between 3700-2600 B.C. This period of one thousand years of settlement of small groups is recorded in the form of small mounds all over this borderland. We might look into the significant features of some of the most important of these sites.

Kili Ghul Mohammad is a small mound of less than 500 sq mt near the city of Quetta which was excavated by Fairervis in 1950. Three distinct cultural phases were identified within a dig reaching almost a depth of 11 metres. The lowest 5 metres out of this, identified as phase I is characterized by remains of hut made of pise, wattle and daub, numerous microlithic blades and some bone tools. Bones of sheep, goat and cattle are known in good number and these have been identified as domesticated. No cereals have been found although evidence of cereal collection should be indicative from the sickle blades identified. A solitary piece of limestone slab found is suspected to be a fragment of a grinding stone. Bone points and awls are also significant. Absence of both axes and pottery put this culture as purely a seasonal camp of a pastoral community. The subsequent phase clearly demonstrates an internal evolution of this form of non-farming Neolithic into a fairly stable Neolithic culture with wheel-made pottery and metal use albeit in a limited way.

Dan b Sadat is another mound lying only 12 km south of Kili Ghul Mohammad. It shows a continuation of form right after where Kili Ghul Mohammad ends. Anjira, Rana Ghundai and many other mounds show this common feature of a Neolithic growing out of a pastoral base. It is needless to emphasize that the youngest phases of all these

finds lie almost on the threshold of Harappan Chalcolithic in chronological sense. No wonder that even in the earliest phase of Kili Ghul Mohammad one is surprised to find a precious stone bead

Mehergarh

In 1977 the French archaeological exploration reported a very significant and widespread site near the Bolan pass in Baluchistan. This site, called Mehergarh was excavated by Jarrige and Lechevalier since then. It is probably the closest to Indus plain Neolithic sites known till today. Nearly 11 meter deep occupation debris have been excavated and in all 7 archaeological periods are identified. Of these periods I-III are considered as Neolithic. A radio-carbon date of 5100 B.C. has been obtained from 5 concurrent results from the earliest period. Thus, Mehergarh is undoubtedly one of the oldest Neolithic occurrences from this region.

The period I is further sub-divided into Ia and Ib. It is argued that period Ia represents a semi nomadic settlement having no use of permanent house. The mud brick structures belong to this period and continues into period II. This Period yields rectangular houses with multiple rooms. Big rooms had well planned storage complex. In addition to these a raised platform described as funerary platform is also described from this excavation. The artefacts recovered from these two periods are stone and bone objects including a large number of microliths on flint. Microlithic blades are the only known tools from the lowest level. These include lunates, trapezes, triangles and unretouched blades. Some of these microliths have bitumen adhering to them. In period II a set of ten microliths has been found hafted in a saw like manner with bitumen used as mount. This can be taken to indicate that the microliths in period-I, which also have bitumen sticking to them, must have been also used likewise. Although no proper ceramics occur in this period, remains of baskets with bitumen coating have been found. Only one ground axe has been recovered from a burial but numerous others found from the surface can help us to believe that grinding-polishing as a technique has already been established at this early date.

Similarly hammer-stones, ring stones, querns and grinding stones must have also been used although we have poor evidence of this from period I. Some of the most surprising features of Mehrgarh-I besides the habitational structures are two tiny grave goods- one copper bead and some turquoise beads. This proves at once the choice of items sought and a trade like phenomenon existing much before the time we have accepted them in existence earlier. That these preferences become a regular feature nearly 2000 years later in the Harappan urban centers, would therefore be not surprising at all. In period II, this is further added by one perforated pendant of lead and several beads of Lapis-lazuli. The subsequent phases show the introduction of handmade and wheel made pottery without much change in the Neolithic cult.gens associated with it. Finally it is demonstrated that wheat, barley, date and cotton were domesticated. Animal bones found are predominant in sheep, goat, cattle and buffaloes. All estimations tend to indicate that these were domesticated species. The wild animal remains are identified as those of gazelle, swamp deer, nilgai, black buck, onagar, chital, water buffaloes, wild cattle, wild sheep, wild goat, wild pig and elephant. The evidence of late aceramic period shows the presence of domestic goats, sheep and cattle.

The succeeding phase which has been classified as Period II a overlies the upper level of the aceramic Neolithic occupation. The cultural remains of this period are almost similar to period I. Additional artefacts comprise a few stone vessels, fragments of thick alabaster bowls, coarse hand made chaff-tempered red slipped pottery, good number of structural remains, a grooved elephant tusk and some tools of stone and bone similar to those found from the aceramic level.

The period IIb and IIc are characterised by the change in ceramic industry. This phase also records several pottery types which include basket marked pottery, fine wheel thrown pottery with black geometric designs and animal motifs. These compare with Kili Ghul Mohammed II ceramic types. Typical transverse arrow head set in bitumen and

borers for bead making with few examples of ground stone tools form the other characteristic finds from this period.

Mehargarh is, therefore, a spectacular discovery of a community with rudimentary evidences of all those attributes and achievements which has been taken as prime mover to urban civilization- but occurring nearly 2000 years earlier within a culture which essentially was merely stone using and pre-ceramic in character.

3. Burzahom

Not very far from Srinagar on the second terrace of Jhelum at least two Neolithic sites are known till date. These are Burzahom and Martand. The former, which has been excavated now for several years, has yielded at least 3 archaeological periods of occupation. A large number of similar other sites have been recorded from all along the Jhelum from Anantnag to Pampur and also elsewhere in the Kashmir Valley. It is believed that these sites are all similar to Burzahom.

At Burzahom 16 dwelling pits have been exposed and all of these belong to the earliest period (I). Most of these are circular to oval at top although at the bottom they tend to be square or rectangular. One of the largest of these pits measures 2.7 meter in diameter at the top. At the base it expands to 4.6 meter, and its depth is nearly 4 meters. A stair has also been cut on the earth to enable one to reach the bottom. The ground on the surface shows a number of post-holes which are believed to have supported a thatched cover on the pit. Since the Neolithic people used to live in the pit and also had fire burning on their living floor, the roof had often been burnt down. Around one pit as many as 45 post-holes have been found showing the number of times the thatched roof may have been destroyed and re-erected. The radio-carbon date for the oldest layer is 2375 B.C. The youngest period (III) goes upto 1550 B.C., i.e. the entire occupation has a duration which is parallel to the rise and decline of Harappa.

The cultural features of Burzahom period I appear quite significant. These people buried their dead in a variety of

methods. Some are found buried in crouched position, some in extended form and there are yet some which represent secondary interment. The skeletons were often covered with red ochre. In one case the evidence of trepanning of the skull proves their possible knowledge of some kind of primitive surgery. Finally, in many cases either a full wild dog or selected bones of dogs are found buried with the human skeletons. The pottery from phase I is represented by hand made, coarsely finished, ill fired pot sherds only. The only near complete shape found represents a 26 inches high jar with cylindrical neck and a flaring lip with a round bottom. It shows marks of woven mats on its surface. The celts recovered show a wide variety of function and form. These include axes, wedges, chisels, adzes, hoes, pick and perforated picks, besides ring stones, sling stones and querns. The bone tools found are equally rich. Harpoons, eyed needles, points and arrow heads are some of the most commonly occurring types among them. Microliths are conspicuously absent all through. Rectangular stone knives, with 2 holes driven along one of the long borders, have been termed the *harvester*. These types are not known from anywhere else in India but are quite common in north Chinese Neoliths. Domesticated plants have so far not been reported from any of these Neolithic layers.

The borderland consideration briefly summarized above clearly shows two distinct varieties of Neolithic emerging at the southern and the northern parts of our western door step. It is needless to emphasize that these have neither chronological, nor any typo-technological similarity with each other.

In the eastern gateway, however, the evidences are not so wide spread. In Thailand one of the most spectacular discoveries has come from the excavation of the Spirit cave. Large number of fruit, nut, tuber and creeper crops seem to have been domesticated in this region much before cereals are domesticated. At Ban Kao, Ban-Chiang and Non-Nok-Tha even rice and millet seem to have been domesticated from as early as 8000 B.C., if not earlier. Chipped and ground axes, chord marked handmade pottery and numerous hunted animal bones are the other important

finds from these sites occurring over a limited geographic zone. Habitational structures or microliths or for that matter bone tools are conspicuous by their absence.

Within the above back drop if one sets out to study Neolithic in India one is really surprised by the total contrast that the rest of India offers. We will briefly look into some of the important excavated sites to illustrate this point. In the eastern sector we have just about four excavated sites of which only 2 yield a series of radio-carbon dates. We might hasten to add that Neolithic celts from surface are by no means scanty. Large number of these tools have been recorded from almost all the 4 states that comprise this zone (Bihar, W. Bengal, Orissa and Assam and adjoining states)

Gufkral. This is a site situated around 40 km south-east of Srinagar and it was excavated by Sharma in 1981. It shows 3 distinct periods of occupations and these are described as follows. - Period IA: Aceramic Neolithic, Period IB and IC - Early and late Neolithic. These are followed by a last group described as Megalithic.

In period IA the cultural remains are comparable to those of Burzahom. The population lived in under ground pits. The stone tools described constitute of points, scrapers, axes, drills, picks, pounders, querns and mace heads. Bone needles and points are also identified. Bones of diverse wild species like ibex, bear, goat, sheep, cattle, wolf and Kashmiri stag are described along with some goat and sheep which are claimed as domesticated.

Period IB yielded handmade pottery-most of them having mat impression at the base similar to what has been observed at Burzahom. In addition the animal bones and stone tools continue without any significant change.

Period IC produced remains of mature Neolithic phase with ground stone celts, querns, pounders and baks. Bone tools continue without any change. Some terra cotta spindle whorls are also described.

The oldest C-14 date for period IB of Gufkral is estimated as 3930 ± 120 B.P. It is argued that the aceramic Neolithic level should be about 400 to 500 years older than this.

Chirand

In the Gangetic plain Neolithic sites are known from Allahabad and north Bihar alone. Chirand is an early historic mound in district Saran (Chhapra). There are three phases identified by the excavators. Phase I out of these is metal-free and hence attributed to the Neolithic period. The oldest Carbon-14 date recorded so far is 1755 B.C. and these dates being not from Phase I, it is generally believed that Neolithic occupation at the site must have taken place well within 3rd millennium B.C. i.e. (around 2000 B.C.)

The main feature of this site is an overwhelming amount of bone and antler tools. In fact actual celts from both Phase I and II combined are only 4 in number. In addition to these a developed microlithic industry of blades, lunates, points and borers is also present. The houses unearthed are circular with 2 meter diameter with bamboo and mud plastered walls and paved floors. It is suggestive that initially pit-dwellings with thatched roofs were used but later on they took to overground dwelling structures. In one of these huts a cluster of ovens with a longitudinal passage was unearthed. The pottery is extremely well made and may have been prepared on turn table. Red, Gray, Black and Black-and-Red ware occurs in all the three phases though phase I is dominated by a burnished red-ware which is given some criss-cross designs as well. Different types of bowls, footed cups, channel spouted as also narrow spouted vessels constitute the types. Several terracotta objects form another important feature of this site. These include besides beads, bangles and wheels, several bulls, birds and serpents figurines. The bone tools, which are perhaps the richest of any prehistoric find, include a variety of picks, scrapers, eyed needles, bodkins, and pierced batons. Harpoons, or for that matter, fishing hooks are not known so far. Evidence of domesticated wheat, rice, masoor and moong seems to be a very significant feature about this early Neolithic settlement. Elephant, rhino, buffalo, ox, stag and deer remains are also found in plenty but whether these or any specific group from these were domesticated is not known.

Koldihawa

South of Allahabad in the neighbourhood of the Mahayara-Dam Dams cluster occurs this Chalcolithic mound which had yielded a Neolithic layer dated to almost 5440 B.C. This site drew a great deal of attention primarily because domesticated rice in pure Neolithic group has so far not been recorded from such an early date.

It seems that several strata of circular huts marked by post-holes have been identified underlying a Chalcolithic deposit. Microlithic blades and ground stone axes form the main tool kit besides some bone tools. Along with these several crude, hand made and ill fired potsherds also occur. These potsherds carry chord impressions or basket marks besides having rice husk sticking within the clay in some instances. Palaeobotanical analysis of the rice husks used in the paste of the pottery showed that the rice belongs to the domesticated variety. This, on the basis of the C-14 dates, would establish this site as recording the earliest evidence of domestication of rice in this sub-continent. A distinctive feature of this site is the claim of a cattle pen with post-holes at the corners and hoof impressions on the floor. The animal bones identified are sheep, goat and cattle besides some hunted wild forms. There is a possibility that this early date is not finally confirmed. In such a case Koldihawa would, at best, be taken as contemporary to Chirand.

Chopani-Mando. This site is situated on the left bank of Belan and is about 70 km. south-east of Allahabad town. The excavation shows three different phases of cultures. These are identified as Epi-Palaeolithic, Early Mesolithic to Advanced Mesolithic or Proto-Neolithic. The earlier details known from this site has already been discussed in the chapter of Mesolithic. Thus, here we shall record only the characteristic cultural details of Period III. The tools recorded are a variety of ground stone tools, hammer stones, anvils, querns, mullers and ring stones. Few potsherds of thick fabric and hand made variety accompany these. Besides these hut foundation with fire hearths are also described. It is worthwhile to note that the Mesolithic

phase at Chopani Mando has been ascribed to Circa 9th-8th millennium B.C.

Mahagara. It is a single cultural site situated on the right bank of the river Belan. A 2.6 meter thick occupational debris has been excavated and six structural phases identified. A series of successive floors, post holes and pits occur within this deposit. Neolithic celts, microlithic blades, pottery, querns, mullers, sling balls, arrow heads, terra cotta beads and numerous animal bones constitute the inventory. Ceramics are cord impressed, rusticated, burnished red and burnished black. These are all hand made. Animal bones consist of wild cattle, domesticated cattle, sheep, goat and horse. Rice was identified in this site as well.

Two TL dates are available for this layer and they are 2265 B.C. and 1616 B.C. The radio carbon date is 1440 ± 150 B.C.

Sohagauna. It is situated in north eastern U.P. in district Gorakhpur. At the earliest level a kind of cord-impressed pottery were found in the limited digging done and it was attributed to Neolithic status. It seems to fit with the Neolithic from Bihar and West Bengal rather than the middle Ganga cluster.

Neoliths from Santal Parganas

Rev. Bodding of the Norwegian Mission first-started the collection of prehistoric artifacts from Santal Parganas. Bodding's collection of nearly 2600 antiquities which are kept in Oslo museum were studied by F.A. Allchin. The artifacts include more than 2000 axes, adzes, rubbers and hammer stones and some microliths. Bodding thinks that these were collected from Dumka region and also show few shouldered specimens- indicating connection with south east Asia.

Orlup. This is situated on the right bank of the river Ganga in Bhagalpur district. Four periods are identified in the excavation (Sahay, 1982). Period I is designated as a black-and-red ware horizon and includes black slipped, red ware as well. In association with this occurs terra cotta female figurines, bangles of tortoise shells, microlithic tools and

some fishing hooks of copper. Bone as well as beads of agate and carnelian are also found from this period. The other layers identified are . Period II- N.B.P., Period III- Sunga-Kushan and Gupta and finally Period IV-Muslim period. Evidently this has to be counted as a late variety of Neolithic with copper intrusion.

Sonapur. Another site located at district Gaya which compare with Oriup. Black-and-Red ware ceramics is accompanied with copper. Hut evidences seem to indicate wattle and daub structure.

Chechar Kutubpur. This is also situated along the Ganga basin and is in Vaishali district. Here Period I yields Neolithic objects overlying the natural soil. This period is further sub-divided into three phases A, B and C. Phase A is comparable to the Neolithic of Chirand. Huts structural remains of wattle and daub are found along with profusion of bone and antler tools. A double forked pick on antler is a unique type recorded.

Period IB is distinguished by the traditions of ceramics and some house structural remains. Finally Period Ic marks the appearance of black-and-ware ceramics. Stone and bone tool types in these above two phases do not show any significant change from those known from IA.

Baradih. It is a Neolithic site on the bank of the river Sanjay in Singhbhum district. Sen (1969) studied this occurrence. According to Sen the cultural complex of the site is discernable in two distinct phases. The earlier deposit shows an assemblage of polished axes, adzes and other stone artifacts along with charcoal and hand made pottery. The later phase shows carbonized rice grains, charcoal, wheel made pottery including black burnished ware, iron objects, polished axes and other stones tools. A large number of stone celts were collected from the surface. Only 15 celts were recovered from the excavation while as many as 160 celts are collected from the surface. The trapezoidal form of celt occurs in largest number and this is followed by triangular, sub-triangular and oval forms. Other stone tools described are ponders, hammerstones, fabricators, ring stones and saddle-querns. An iron sickle like object and

some grains of carbonized rice identified as *Oryza sativa* forms the other interesting features of Barudi. The radio carbon date puts it to the end of second millennium B.C.

Dugul. It is located about 3km. east of Barudi and is on the south bank of river Sanjay. The site was excavated by Sen (1962, 1969). This revealed a large number of Neolithic celts and pot sherds. The types identified are adzes or hoes, chisels, scrapers on flake, hammer stones, pounders, ring stones and saddle querns. The celts are described as (i) Triangular pointed butt ones with straight or bevelled cutting edge ; (ii) Oval, round butt, slightly convex cutting edge, chipped and ground in equal proportion. A third variety is described as having parallel sides and highly convex and bevelled cutting edge with more ground than chipped surface.

Golabal Sasar. The site is on the left bank of Mandakani in Puri district of Orissa. Archaeological Survey of India excavated the site in 1991-92. Seven trenches were dug and a cultural succession was constructed as follows :

Period I	—	Neolithic
Period IIA	—	Chalcolithic
Period IIB	—	Iron Age.

Ground and polished stone tools found in Period I consist of axes, adzes, chisels and querns. One of the celts is described as shouldered. Tools are also made on semi mineralized bones and antlers. Types identified are points, burins, chisels, adzes, needles, arrow heads and harpoons. Hand made pottery fragments have also been recorded from this phase. The animals identified from the bones are sheep, goat, humped cattle and stag. A tentative chronology for phase I is put in the bracket of C 1600 B.C.

Bulabh dihi. Recently Behera (1992) discovered this Neolithic site near the Brahmani Valley in the Bonaigarh sub-division of Orissa. The site is in the form of four large mounds of occupational debris. There are hundreds of broken as well as complete specimens of celts described. Many of these celts are finished as adzes or chisels.

Kuchai

Within the highly consolidated lateritic Mayurbhanj plateau and not far from the river Burhabalang Thapar excavated a Neolithic site at Kuchai. Neolithic axes, faceted hoes, chisels, mace-heads and grinding stones are the Neolithic types discovered. Some pot-sherds of red colour constitute the ceramic form. The tools, including the mace-heads, are much smaller in size than the Neoliths known from further south in Andhra or Karnataka. No radio-carbon date of the site is available.

Daojali Hading

Further east and in the north Cachar hills another type of Neolithic adaptation is recorded from Daojali Hading. Unfortunately, this small scale excavation conducted by T.C. Sharma could not yield any evidence of habitation structure, although a large collection of ground and polished celts besides grinding stones and pot-sherds have been described. No microliths or bone tools are known from this site.

The celts were mostly shouldered at the butt end and had the border ground sharp. Sharp angular shouldering in the celts from these hilly Neoliths led many to doubt their antiquity. It was argued that such sharp cutting of stones can only be done by metal and hence these must be belonging to a much younger date. This controversy could be partially settled by the exvaton of Daojali Hading, which obviously does not show any metal age features. Further, some experts could physically demonstrate how a sliver of bamboo can be expertly used to cut the local soft stones (jadite). Some slabs of stones with grooves on them were also found in the excavation and this was explained as stones on which grinding of the stone axes was done. The ceramics recovered are extremely fragmented and hence could not be used for shape reconstruction. The fabric is coarse and shows evikdence of having been hand made and ill fired. Almost all sherds carry cord impressions. Teh absence of microliths, bone tools and artificially reconstructed habitation in addition to the occurrence of the distinctive variety of celts led many specialists to believe

that Daojali Hading may be representing a break-away group from Yunnan who developed a specialized area around Daojali Hading two more sites have been excavated. The cultural material retrieved from these sites (Sarutaru and Marnkdola) is also not different from the Daojali Hading material culture. There are some radio-carbon dates available from these later sites but these show almost a B.C./A.D. border line for these Neolithic occupations.

Lest one is led to believe that the north eastern regions of India is poor in terms of Neolithic evidences we might as well record some of the numerous other sites from where Neoliths have been collected from surface. For instance Dani, Sharma and others have reported 17 tools from Mishmi hills, Abor hills and Ningru on the bank of the Noa Dihing river. In 1970 some more Neoliths were reported from Kalmang, Lati and Telly area of Lohit district. These also include a shouldered celt. Dani studied Neoliths collected from 24 sites in different parts of Nagaland. Some of the sites are Rokimi, Karami, Lazami, Tichipani, Shiromi, Natami and Rochagah etc. These sites yield in total 236 Neolithic tools besides other antiquities. Recently another Neolithic site was discovered in the vicinity of Bash village in Phek district of Nagaland bordering Myanmar.

Neolithic collection of Garo hills of Meghalaya which is kept in the Pitt-River Museum at Oxford has been studied by Dani. Earlier Sharma had reported 12 more sites from the same area which include celts, chisels, axes and hammer stones. M.C. Goswami records Neolithic evidences from Salbaigiri, Rongigiri, and Thusekgiri regions in a separate exploration in the Garo hills.

Besides the sites of Daojali-Hading and Sarutaru which have yielded stratified Neolithic deposits the state of Assam has no other stratified sites. Although a large number of Neolithic occurrences have been recorded from several districts of the Brahmaputra valley. From Dibrugarh Neolithics have been recorded from Lahowal, Naharkatya and Burkhamatigaon. These include flat celts, tanged celts, hog-back type of celts, axes, chisels etc., In Darrang district which lies in the central part of Brahmaputra valley 156 Neoliths were found while digging a ditch at Biswanath. A

few specimens from this collection show similarity with those found in north China. From the southern fringe of the Shillong plateau of Kamrup district Garo and Dima has report several Neolithic sites. Of these Sarutarn has been excavated and it yielded a cultural deposit of 20 cm thickness. The excavation yielded several ill fired blackish grey pottery along with ground cells. Finally some Neolithics have also been described from Kungpa, area of Ukhrul.

Most of the Neolithic evidences from the rest of India are known from the region lying south of Narmada. Although Krishnaswami identified two separate zones within this area- the central and western zone and the southern zone, we might treat the area as a single zone because there are stronger similarities in the whole area than differences within. Prehistoric sites spread over the entire area show a Chalcolithic culture which lies immediately above a Mesolithic layer. In most cases there is a layer or two of pre-metal industries found sandwiched between the Mesolithic and the Chalcolithic. Many specialists do not find it very logical to isolate these few layers to develop a picture of Neolithic for the area. Instead they would like to designate the total culture as **Neo-Chalcolithic** or **Deccan Chalcolithic** or even **Deccan Neolithic**. The latter name is preferred by some because the metal component of these occurrences is rather insignificant. The radio-carbon dates of these finds range from 2400 B.C. to 900 B.C. So far nearly two dozen major sites have been excavated from this whole region. But several more of these sites are recorded. Of the plant remains evidence of millet, horse gram, legumes, date palm; and bajra are the common varieties known from these sites.

Earliest Rise of Farming in the South

Prehistorians generally agree that probably village farming began in the peninsular region at a time when Early Indus state was consolidating in the north, i.e. from around 3000 B.C. The site indicating these early settlers are the so called ash-mounds discovered from the Andhra-Karnataka region. The character of these areas of settlement, however is entirely different from those observed in the north west.

Such excavated sites as Ulmar, Kuppai, Kodakal and Pallavoy show distinct evidence of a strong pastoral base in their economy and society. These sites not only yield celts but also rich microlithic blades and also bone tools. The accompanying ceramics is rather crude and hand made with a gray or buff to brown fabric. Animal bones found indicate that not only cattle was domesticated but goat and sheep were also maintained.

Deccan Neolithic

At Tekkalkota (Karnataka) 19 remains of small circular huts with 3 meter to 5 meter diameter were recorded. These ranged from 1780 B.C. to 1540 B.C. in date. Small and big wooden posts were erected in some cases while in others no such post-holes are seen. Natural boulders and rocks scattered on the surface have been taken advantage of to hold the structure. Burials are found under the floor of the house. Sometimes bodies have been interred within urns. The granitic boulders near the site show some art execution by pecking and bruising, and also at times painting with red ochre. A bull, deer, gazelle or stylized human figures are some of the usual depictions recorded at many of these Andhra and Karnataka sites. That these art works are of Neolithic period is supported by a gray ware ceramic lid found from Tekkalkota excavation. A bull, a cobra and two antelopes are executed in this lid by puncturing the clay when it was leather-hard. Animal bones recovered indicate domesticated cattle, mainly buffalo, goat, sheep and dog. Experts have even opined that ankylosis of the hock joints noted in the cattle bones might indicate their use as draft animals. Brahmagiri, Sangankallu, and Hallur in Karnataka, Palihol in Andhra and Panampalli in Tamil Nadu are some of the well known sites from southern Neolithic zone which show similar features. All these sites show rather scattered habitation with a fairly interesting ceramic content but otherwise with mainly microliths. Neolithic axes or saddle and querns are found but in frequencies as one should expect in a Neolithic settlement. The ceramics are dull gray in colour and are as a rule hand made. The shapes seem fairly exotic and do not match the personality of the culture. There are a variety of spouted

vessels, some of them with hollow stands and low down external carination. Decoration as a rule is either missing or very insignificant. Some of these sites besides yielding what has been described above show large areas covered by cow dung ash. At one site (Utnur) even the hoof impression from cattle pen ash mound has been identified. These evidences also led to the usage of the term 'Neolithic Ash mound sites' in the literature. Evidently such evidences came quite useful in interpreting a cattle keeping pastoral economy for the Neolithic in south India. At this stage of our knowledge we can simply point out that even if this is true it does not apply to all the sites known from this zone. Interestingly enough the character of the sites shows no change either in habitation or the total material culture even after the arrival of metals. In one of these sites (Tekkalkota) a gold toe ring appears with these microliths and celts. In fact if there is change it is more towards a decline in the ceramic variability. A true change indicating a more complex social organization is indicative only after the arrival of iron.

In the last two decades a large number of Neolithic evidences have been added in Deccan region. For instance almost 80 new sites are reported by Raju (1985), 30 sites are added by Ameer (1981) and another 25 sites by Krishna Rao (1985). Around western Andhra Pradesh 45 sites are recorded by Ram Reddy (1978). Among the excavated sites the important ones are Nagarjuna Konda (Sunder Rajan, 1958, Subramanyam 1975), Utnur (Allchin, 1961), Palavoy (Ram Reddy 1978), Veerapuram (Sastri et al, 1984), Ramapuram (Narasimhaiah, 1981) and Madhura wada (Thimma Reddy, 1978).

In the recent years Telugu University at Hyderabad excavated a multi-cultural site called **Elehuru** in the Prakasham district of Andhra Pradesh. It was a very limited excavation and is reported to have yielded Neolithic to Early Historic occupation. The Neolithic occupation is evidenced through a deposit of only 1.5 meters of habitation debris. The evidences include a circular hut structure and burials. The other antiquities comprise of celts, rubbers, grinders,

querns, mullers and sling balls. The ceramics is hand made and include fabrics of red ware, black ware, buff ware and black-and-red ware. Peddamudiyam is another site of similar nature known from Cuddapah district. There are two radio carbon dated of its Neolithic stage reported. These are :

i) 3490 ± 90 B.P. = 1540 B.C.

ii) 3069 ± 120 B.P. = 1100 B.C.

In Tamil Nadu as well several sites of broadly this character recorded in the recent years. Amongst these Payyampalli of North Arcot district yield some C-14 dates which are

i) 3145 - 1760 B.C. for Neolithic phase

ii) 1750 - 1270 B.C. for Pre-Iron phase

The other sites are Chandra puram from North Arcot, Goliapalli, Togarapalli, Kappalavadi and Bargur from Dharmapuri district.

Since culturally such an unchanging status inspite of the knowledge of a new and better technology is untenable, one has to seek an alternate explanation for them. The size of the habitation and their nature of occurrence can be taken to indicate that these were relatively small hordes of Mesolithic hunters who settled around the rocky plains primarily because the lower levels were relatively more forested. The attempt to settle down by these hunter-gatherers was more of seasonal nature and they did not domesticate any seed crop for long time. Their main carbohydrate source, in all probability, was from a sexually reproducing plants and their roots. Those among them who moved to the lower valleys did so with the power of both their large demographic strength as also their polished stone axes with which they could clear the dense forests. Navdatoli, Damabad and Inamgaon in Maharashtra might be representing such break away branches who developed stable villages albeit with some copper items intruding in them. A conservative estimation for this change can be put to 1700 B.C. A third group whose pastoral economy seems to be archaeologically demonstrative by the ash mounds in Andhra may have had connection with the north western

late Harappan region from where the economy with cattle emphasis was brought and re-adapted to the southern plains in the form of pastoralism. The route of this connection that is usually alluded to by some is south Gujarat, north Maharashtra, east Maharashtra to northern Karnataka.

The economy within which these people sought their adaptation was not the least conducive to the development of large scale agricultural settlements. Even today these regions of Karnataka receive less than 25" rainfall in a year. The tropical monsoon exhausts itself either on the western or eastern coast (depending on the time of the year) and therefore an arid area develops around the region which is equidistant from both the coasts. These isolated groups must have had relationship with each other based on either marriage or economic exchange. Cultivation of seed crops is recorded only around 1600 B.C. and here too such sturdy kintu crops were selected which require small patches of land only. Ragi and Hulra are the millets which are found commonly in them. Apparently this adaptation brought virtually no change in the demographic picture, at least not strong enough to call for intensification of economy, because in that case the tool-kit would certainly have shown evidence of a corresponding change. Plough agriculture, therefore, had not developed among these hill dwellers.

It is a strong likelihood, specially in view of the fact of rather late continuation of these hill habitat and economy, that a symbiotic relationship with higher cultures might have come into being. The relationship of the hill dwellers with the agricultural group can take various shades of expression. A purely economic contact for exchange is what the settled group ideally desires and to keep the process ongoing the peasants would like to see that the hill dwellers do not change their economy. For the hill dweller getting cereals in exchange of forest produce keeps him fed on the products of different ecology and different technology. He enjoys the fruits of an altogether alien system. Import of the product of higher and different technology prevents the hill dwellers from internalising the surplus advantage of agriculture. It is, therefore, not surprising that we see

virtually no change in the character of these sites for nearly 2000 years. Even after metal appears on the scene the habitation or the cultural repertoire remains unchanged. This might be argued as caused by the fact that the basic economic pursuits of these people are not affected by these imports. Under such a condition items imported always developed exotic or ornamental value. The isolated occurrence of a gold ring here or beads there in Deccan Neolithic area can more plausibly be explained through the above argument.

New Evidences of Agriculture:

An early lake site settlement in the village named Jahuradewa near Gorakhpur was excavated by the U P State Archaeology Department under the leadership of Rakesh Tewari. The excavation reveals evidences of settled life of Early Farming Tradition characterised by cereal cultivation. In all 5 periods are identified. These are described as follows:

Period I	Early Farming Phase
Period II	Developed Farming Phase
Period III	Advanced Farming / Early Iron Age
Period IV	N B P W Phase
Period V	Early Historic (Early BC / AD centuries)

The earliest period marks the beginning of sedentary occupation. Two sub periods IA and IB are identified of which sub-period IA yielded an occupational debris of nearly 45-50 cm. It is characterised by a coarse variety of hand made red ware often displaying cord impression on the exterior surface. Faunal remains included some bones and a tortoise shell. Plant material discovered are carbonized grains and glume pieces of rice conforming morphologically to those of domesticated form (*Oryza sativa*). Radiocarbon dates were obtained from wood charcoal from this deposit. One of the oldest of this series of dates is 6290 ± 160 B.P. or 5298 B.C. This would indicate that in all probability rice cultivation originated in the Terai region from where it spread on to the south of Allahabad region and also to other areas further east.

sub-period IB has a occupation floor of 45 cm. thickness * Ceramics shows both Black-and Red ware as also slipped ware. It has a radiocarbon date 2135 B.C. Period II marks the beginning of a rich variety of ceramics. Spouted vessels and dish on stand become quite common ceramic type. In addition terracotta objects and beads, storage bins, baked Terra cotta tiles are some of the other important antiquities known from this period. Period III marks the emergence of Iron.

The most important aspect of Lahuradewa discovery is summarised by the excavators in the following manner.

"In view of the outcome of the first season's work Lahuradewa and the earlier archaeological evidence available from Koldihwa /Mahagara and Kunjhun etc., in the north Vindhyas and Jhansi, Damdama, Imhidi Khurd, Khairadih, Chirand and Senwar etc., in the Ganga Plain, following important observations were underlined in the first preliminary report: Rice based agriculture was prevailing at least in an area extended from the Himalayan terai to north Vindhya during, circa 6th to 3rd millennium B.C. onwards. A diffusion of rice cultivation from the Ganga Plain to Harappan zone was also suggested during 3rd millennium B.C. where rice is documented on a number of sites in Haryana and Punjab datable to 2850 B.C. to the Early Historic times."

(Rakesh Tewari. 2005-2006. *Pragdhara*. No. 16 pp.37-38)



Chalcolithic

General Considerations

A discussion of Chalcolithic India as a chrono-cultural phase becomes difficult because of the acute incongruencies recorded between various regions within the country. To an anthropologist, however, these incongruencies are mainly caused by our methodological short-sightedness. When we are dealing with culture change we need to keep in our mind that culture seldom changes on its own initiatives. The multiple imperatives operating within a community are the ones which act as the prime mover. Thus, if a

community seeks adaptation within a not-too-favourable ecology and can keep its population density from changing then its progression towards a complex social structure can be enormously retarded. Looking at the available geo-climatic data from the western coast it would be quite clear that around 3000 B.C. the sea level was up by a minimum of 3 metres and this more or less coincided with the humid C-palynological zone identified at Pushkar. It is around this time that Kili Ghul Mohammad and Damb Sadat occupations took place in Baluchistan region. Periods of dry phases have since then been occurring at increasing frequency. Finally, around 1000 B.C. in the entire region from Baluchistan including southern Afghanistan to almost Iran desert, conditions overpowered the stretch. In rest of India this dry phase must have considerably increased the steppe cover and created numerous lakes. Who discovered the first metal, copper or how he harnessed it within his culture will perhaps never be known but we will consider the cultural features of some of these archaeological evidences where copper has been found with stone tools and hence referred to as Chalcolithic period.

The western border

Towards the north of Kandhar city and not very far from Lashkari Bazar in Afghanistan occurs the famous site of Mundigak which was excavated for 10 years from 1951. Mundigak does not exactly form the western border of India but it is important for two reasons:

- 1 It is a site which lies almost mid-way between the Iranian influence in the west and the Baluchi region in the east.
- 2 Lashkari Bazar was Mahamud Ghazni's winter capital from where he controlled the passes from Kandhar to Indus valley in order to invade the country at his will. Mundigak and its influence in the same manner might have had a monopoly influence in the Indus region.

It is needless to emphasise that Mundigak is completely an independent development of Afghanistan but flourished long enough (approx. 4000 B.C. to 2000 B.C.) to show the

spread of its influence farther east, at the same time being itself influenced from the west. Briefly speaking 4 distinct periods of occupation have been identified.

Period I: Radio-carbon date from nearly top of this period is estimated as 3945 B.C. This represents a semi-nomadic occupation and rudimentary evidences of dwelling which might have been constructed with pise are found in the initial phases of this period. The final phases show mud brick used for rectangular houses with compartments made inside. Fire hearths or ovens are found within the rooms. Wheel-made painted ware found usually included various kinds of bowls, cups and jars. Figurines of cattle and humans along with both alabaster and copper are found from this period. Some of the pottery has even polychrome paintings on them.

Period II: The radio-carbon date for this period is 3480 B.C. Although there is a denser occupation in this period, there are hardly any cultural innovation recorded. Infact the ceramics are distinctly cruder than the older period. Sling stones, stone arrow points, crude stone button seals and bones are the other objects recorded. The dwelling structures follow almost the same pattern.

Period III: The radio-carbon date for this period is 2995 B.C. The period is marked by very well painted wheel-made pots. Dwelling structures are still prepared by sun baked clay and there appears to be more emphasis on clusters of smaller rectangular rooms, each one of them maintaining a door which opens outside but without any inner connection between the rooms. Wells are dug between these room clusters. Bronze axes with hole and socket, bone and stone tools form the other cultural objects of this period. Big narrow-mouthed jars, funnel shaped bowls, deep bowls with flat or rimmed base besides the typical beaker shaped vessels form the usual types. The paintings executed are usually geometric with filled-in areas. But palpal leaf and birds are also recorded in some cases.

Period IV: A radio-carbon date of 2500 B.C. is ascribed to this period. for the first time the settlement shows a

transformation towards fortified city features, although the bricks used are still sun dried. Massive defence walls, square bastions, and temple complex form the main structures of this period. Pottery shows red slipped ware on which extensive decoration with black paint has been done. Various patterns of filled in geometric designs form the usual motifs but birds, ibex, bull and pipal leaf are also executed. Terra cotta female figurines and male head with hair tied behind are the other two important features of this period. Apparently many of the features of Mundigak-IV have their parallel in the sites lying further east in the Quetta valley. Mundigak offers a near complete archaeological evidence of a village evolving into an urban civilization with high degree of social complexity. But this would appear very simplistic unless we can keep our minds open to various cross-currents of influence that might have been working on this population at this time. Normally an Afghan village, with or without the knowledge of metal, can be expected to show such a rapid pace of growth as Mundigak seems to indicate. In the absence of concrete evidences of the processes that might have been active in the whole region during the period we always seem to be taking this 2000 years of occupation as long enough to show the rise of a statehood. It does not require much effort to search evidences from the contemporary village India to prove that rise of a state is not a natural eventuality for every farming society. Mundigak, therefore, has to be viewed within the canvas of the entire Irano-Afghan scenario.

The region between Baluchistan and the plains of Indus is marked by several groups of insular developments and each of these has, in some way, influenced the Indus Civilization. These influences are better marked in the Indus ceramics and hence have developed names which refer mainly to the ceramic features. We might attempt to identify these distinctive styles as follows:

Rana Ghundai: It is located very close to the Loralai town. The lower level which is termed as Period I shows no structural evidence. The period is represented by hand made pottery, stone blade industry and bone tools. The

animal remains consist of goat, humped cattle and sheep. Period II yielded painted black-on-red ware and other ceramic types similar to Kile Ghul Mohammed II.

Parlano Ghundai. It is located on the Zhob valley in the extreme north of Baluchistan. The site was excavated in 1924 by Stein. The earliest phase in this site coincides with Rana Ghundai IIc. The finds comprise leaf-shaped bifacial arrow heads, stone blades, female figurines of the sort commonly known as 'Zhob goldenes'. A distinctive form of ceramics known from this site has roughened surface prepared by rubbing wet hand. Besides these a large number of terra-cotta figurines of humped bulls are also known from here.

A number of other sites with almost similar antiquities are known from this area.

Sur Jangal. It is located in the valley of Thal river in the district Loralai and was excavated by Stein. Three major phases of occupation has been identified. The ceramics of Phase I are coarse but bears painted designs of both humped and humpless bulls like in Kile Ghul Mohammed III ware.

Anjira. It is located 230 km. south of Quetta in central Baluchistan. The excavation uncovered 5 periods of occupation. Period I has no structural debris but it shows ash rich earth, stones and other domestic rubbish. A good number of chert blades occur within this deposit. This is accompanied by a wheel made highly burnished red-slipped ware often with painting in black. Period II is characterized by the mud brick walls on a solid foundation. The ceramics are of two types-red slipped burnished and hand made cream slipped basket marked ware. These compare well with those known from Kile Ghul Mohammed II and III varieties.

Sarai Khola. This site is situated in the Taxila valley and lies barely 3 km. away from it. Halim excavated the site and described 4 periods of occupation. The antiquities recorded are ground stone tools, a flakes blade industry and bone points. The ceramic is represented by a hand made burnished ware. Mughal commented that it compares with

Burzahom Neolithic in India and also with the Yangshao horizon of the Neolithic in China.

Jallipur. It is located 65 km south west of Harappa in the central Indus plain. The site was excavated by Mughal in 1971. It records two clear periods of occupation. Period I records rudimentary evidence of mud brick walls and mud floors. Besides these no substantial structural remains are known from this period. The ceramics is thick in texture and hand made. Globular vessels with a very short neck is a form which reminds one of early stages of Amri. In addition to these chert blades, bone points, terra cotta net sinkers, sheet gold beads and burnt animal bones identified as goat, sheep and gazelle are also recorded.

In the western plains of Indus several other minor sites are known.

Rahman Dheri is an important site in this region. It shows three distinct phases of occupation and was taken as roughly comparable to Gumla II-III. The site revealed mud brick structures which could be parts of the town wall. Probably there were also basic layout of streets. Ceramic types are distinctive and painted in black. Several types of terra cotta figurines are also found. Carbon-14 samples show that the early period dates between 3340 and 3160 B.C. The other two dated put it on the threshold of the Indus period. These range between 2600 to 2480 B.C.

Lewan Dar Dariz. Exploration in the Bannu basin has revealed a number of other sites of significance. Of these Dar Dariz was excavated during 1977-1978. This yielded a rich collection of stone tools, which include ring stone, ground stone axes, hammers and querns. In some of the stones series of grooves produced during grinding of celts could also be demonstrated. The ceramics is painted with black paint and in many aspects these compare with Rahman Dheri.

Quetta Ware: This ware is best evidenced at the two sites of Kile Ghul Mohammad and Damb Sadat. The ceramics are characterized by a distinct variety of decoration and shape. A cream and buff colour slip is used and, over this, bold black colour is used to execute the decoration. The

decorations are mainly in the form of squares, waves and steps. The alternate areas in these lines are executed in colour so that the decoration stands out in bold relief. In the final stages varieties of floral motives are evolved. One of the most characteristic shapes is a beaker shaped ware with ring base and often with slightly concave vertical body.

Zhob Ware: This ware has been described from Periano Ghundai in the extreme north of Baluchistan and is also identified in Mundigak. These are usually red slipped wares which show more of animals, birds and human figure decorations. Open-mouthed bowl with incised lines on the inner surface forms one of the characteristic types of this group. A terra cotta female figurine with goggled eyes and covered head-forms one of the cultural objects and has earned the name of Zhob mother goddess.

Amri-Nal Ware. These two ware groups belong to the same period, though with different origin. Amri culture essentially belongs to the plains while that of Nal to the hills. These two cultures have certain common elements. In both the kinds the fabric is fine and thin and has a cream-coloured slip. The painted designs are mostly geometric, though animal forms also appear in moderately high frequency. The animal forms usually depicted are fish, scorpions and humped bulls. The Amri ceramics are usually bichrome, that is, in red and black. While Amri lies almost on the main Indus valley, Nal is further west and is situated near the Baluch hills. Nal, therefore, shows more evidence of affinity with the sites of hilly Baluchistan. The decorations are in polychrome i.e., colours like black, brown, red, yellow and even blue and green are used.

Kulli ware Like Amri-Nal Kulli also belongs to the southern limit of Baluchistan and Pakistan. 15 km south of Kulli a site called Nindowari has now been excavated which shows a Kulli ware occupation lying directly under a Harappan culture. This culture is usually identified with globular bottle shaped vessels and perforated jars. The fabric is usually buff-pinkish with a white or pale red slip. The decoration usually depicts naturalistic animals often with landscapes and trees etc. Animals drawn are usually shown

humped. Besides these, geometrical designs in the form of series of lines, dots etc. are also commonly executed.

Kot Diji The site lies north of Amri and is situated on the eastern bank of Indus almost within its middle reaches. It has a cream slip with red, sepia or black decoration. Dark or wavy bands with some animal motifs form the usual depictions. Curved horns with six pointed flowers between the horn tips of fish-scale designs take characteristic shapes. Mughal has chosen a large number of Kot Diji pottery types to demonstrate linkage of Early Harappans with this site.

Early Farming Communities of Gujarat

Prior to the emergence of the ancient cities of Indus Valley character many of the adjoining southern and eastern regions show evidence of village settlements. These are entirely different from those recorded from Baluchistan and Afghanistan for the same period.

In the Rupen river estuary of north Gujarat the evidences uncovered at **Prabhas Patan** is quite revealing. The first occupation here is dated to c. 2900 B.C. and is named as 'Pre-Prabhas' period. Unfortunately a very clear picture of the culture is not known. The pottery is mostly gritty and sturdy. These are mostly red or gray ware with incised chevron decorations, although a solitary example of bright red, burnished slip is also present. **Nagwada** is another site from near Baroda which shows the culture during this phase. The period I, which is dated to c. 3000 to 2600 B.C., is probably the earliest evidence of human movement from Sindh to Gujarat before the rise of I.V.C. This phase is mostly recognised by ceramics of hard pink to red fabric. The pottery shapes often compare with those known from pre-urban period of Amri in Sindh.

Thus, we see that from Mundigak to Kot Diji there are numerous early farming communities settled at different nooks of valleys which developed their own characteristic features. The entire episode can be roughly taken to have stayed from 3100 to 2100 B.C., i.e. for approximately 1000 years. Almost all of these sites show ceramic similarity with the Iranian sites on the one hand and Harappans on the

other. It will, therefore, be logical to assume that origin of Harappa may have links with these hill cultures. This relation can be visualized as mere confederation of these 'tribes' as authors of separate cultures or a mere bringing together of the artisans of these cultures under a different and more powerful social organization. Archaeologically speaking all these cultures show certain common processes and features as follows:

1. A simple village life with mud-brick dwellings and microliths with crude pottery forms the emerging pattern.
2. Subsequent phases show little change to support external influence. In fact, many of these continue with microliths inspite of the appearance of metal. Ceramics show a distinct emphasis on very colourful decoration.
3. With time secular structures start appearing with distinct evidence of a large population maintained within the system. Multichrome artistic pottery is soon replaced with black-on-red bichrome styles. Mud brick structures still continue although often a rectangular room without any outlet has been found to evolve. Archaeologists believe that these were merely structures raised on which the actual dwelling was constructed with wood. The raising of the dwelling, therefore, appears as a necessity although we would perhaps never know why.
4. Some of these sites continue to survive even after the Harappans had consolidated their regime in the lower plains.

Indus Valley Civilization

Indus valley civilization is perhaps one of the most widely written topics in Prehistoric Archaeology. In this small attempt to provide essential features of various cultural phases in India we have to be, by necessity, extremely brief in our attempt to summarize this period.

Around 2300 B.C. to 2000 B.C. a large number of sites with spectacular similarity in their cultural features mushroom

all along the Indus and its tributaries and spill over in the adjoining river valleys. The total spread of this culture is now estimated to be over an area of nearly 2 million square kilometers with the river Indus forming the vibrating heartland. The features which mainly characterize this spectacular culture are many. When all these occur together the site is referred to as urban metropolis. These features are listed below.

1. Indus seals with their specific motifs and scripts occurring in steatite, lime stone or alabaster. So far nearly 2000 such seals have been found. Copper tablets containing the same script but slightly different depictions are also known from some sites.
2. A specific fabric, shape and decoration of pottery is almost identically repeated in all these sites.
 - (a) A dark tan slip with well fired wheel-made fabric
 - (b) Goblets with pointed base, cylindrical jars with all round perforations, jars with extended S-profile and dishes on stand are among the most commonly repeated forms.
 - (c) In decoration the most common Indus type is a series of intersecting circles, pipal leaves, peacocks, humped bull and scorpions. These are executed with bold black colour bands between series of lines.
3. In addition to the above terra-cotta cakes, weights and measures, terra-cotta figurines, inlaid beads with tubular holes driven through them and large number of toys in terra-cotta form another series of common feature in this culture.
4. Finally, construction of a fortified township with underground drains, individual houses etc., usually separated from another raised structure (usually referred to as the citadel) where larger structures around a bath are constructed. All these construction show the same measurement of burnt bricks of 7 : 14 . 28 cm (1 : 2 : 4) proportions and are bound together in the same pattern. The citadel as also the lower city was surrounded by defence walls. The plaster used was mainly mud mixed with brick dust and lime.

Most of the sites where the twin city dwelling pattern has been identified are referred to as urban metropolia. The main sites in this group are as follows:

1. Harappa on Ravi in Punjab, Pakistan.
2. Chanhu-daro on Indus in Nawabshah, Pakistan
3. Mohan-jo-daro on Indus in Larkana, Pakistan.
4. Lothal in Sabarmati delta, Gujarat, India.
5. Surkotada in Kutch, Gujarat, India.
6. Kalibangan in Ganganagar, Rajasthan, India.
7. Banawali in Hissar, Haryana, India.

So far more than 200 Harappan sites have been recorded but not more than a dozen of them can be really identified as urban metropolia. (Some authors have counted as many as ninety urban centers). All these urban townships are situated near the bank of a stream or the delta of a river near the coast. Allahdino and Balakot in Pakistan and Lothal and Desalpur in Saurashtra are the examples of the coastal sites.

Initially only two large and sprawling cities of the civilization were known (Mohan-jo-daro and Harappa). But today we have 3 other sites of comparable expanse known. Ganweriwala (80 hectare) and Rakhgarhi (8 hectare) are both situated on the Ghaggar-Hakra course. Dholovira in Kutch also spreads over 50 hectare.

Within the territory of Pakistan the explorations conducted by different authorities including the department of Archaeology, University of Peshawar and Univ. of Pennsylvania, U.S.A. resulted in the discovery of many new sites in Sindh, Northern Punjab and Cholistan. M.R. Mughal who has been working this region for now nearly 3 decades has himself discovered and reported as many as 414 Harappan sites. Most of these have been found in the now dried up coast of river Hakra and the Cholistan desert.

General character

The excavated areas reveal that the structures were built after a rectangular, or at times, parallelogram raised

a platform was constructed with mud-bricks, filling this to a height of 20 to 30'. This raised dominating and overlooking area is called the citadel. There are series of rooms built along the length of a rectangular lake, called the great bath, constructed along one side of the citadel. These rooms have separate and individual stairs leading to the bath. The backyard of these rooms joins with a huge structure which is believed to be the granary. Towards the southern side of the citadel occurs a huge hall like structure without any post-holes for supporting the roof. Further south is the cemetery from where a large collection of skeletons has been made. A separate mound in the east shows the evidence of a line of small rooms apparently for labourers or soldiers and large pounding platforms with burnt wheat. Surrounding this complex of buildings, there is found the defence wall with two entrances. The river flows just below the granary from the north-west side of the excavated region. The living quarters or villages are found in another corner separated from the main citadel complex but within the defence wall. All these structures are erected with burnt bricks of same size and in the same pattern of binding all over and repeated identically in all metropolitan centres.

The residential area shows considerable variation in the size of dwelling. There are houses which are single roomed ones and there are others which have more than dozen rooms with passages, courtyard and bathrooms with individual boundary walls. Drains were covered and led to lanes outside which in turn were connected to soakage pits. Many of these houses are provided with stairways indicating an upper floor. Some of these rooms are as big as 20 ft X 23 ft in size. In many houses private wells have been dug with 3-4 ft circular mouths. A separate mound occurs in most of these sites where a line of small rooms, apparently for labourers or soldiers, is found.

Some of the most significant objects found in these sites are a large number of seals, beads, naturalistic statues, chess boards, weights and measures, terracotta figurines, metal utensils and weapons, stone axes and chert blades. The weights seem to have 1 : 6 fragment system. The measuring

and shows that the unit of length was 13.2 inches and perhaps the lowest fraction was 0.007 inches. Terracotta figurines include some toys, wheeled carts and some grotesque human forms which might be used in some form of folk cult objects.

Indus Chronology

Chronology of Indus Valley civilization has not yet been fixed beyond doubt. This is primarily because first the calibration of the radio-carbon dates had to be corrected on the basis of researches coming out from the radio carbon laboratories, secondly scholars seem to be not really in agreement about where they should begin to count the emergence of the Indus culture. This will be amply demonstrated by the fact that what was earlier termed as **Pre-Harappan** has now been included as **Early Harappan**. Like wise **Mature Harappan** is renamed as **Urban phase of Harappan**. And what was considered as **Late Harappan** is now renamed as **Post Urban phase of Harappan**.

Initially Sir John Marshall estimated the Indus Valley civilization as having emerged around 3100-2750 B C. Mortimer Wheeler subsequently re-examined the archaeological evidences specially the seals of Mesopotamian culture and established a contact of sorts with the Indus. On the basis of the latter and the similarities Wheeler felt that the civilization ranged between 2500 to 1500 B C. D P Agrawal also tried to re-establish the date and announced that Indus ranged between 2350 to 1700 B C. In the recent years many more C-14 dates from a larger number of sites have become available. These indicate that Early Harappans decidedly occur earlier than 2500 B.C. and may even be as old as 3000 B.C. The date for Mature Harappans or Urban Harappans is estimated to be 2500 B.C. to 2000 B.C. Late Harappan or Post Urban Harappan in the same light is pushed to 2000-1500 B.C. and it is believed that at some sites it might even extend to 1200 B.C. The interlocking of P.G.W. which is an Iron using culture at Mitathal or Ganga-Jamuna sites should surely be taken as the Late Harappans continuing to survive till very young period.



The Great Bath :

The pool measures about 39 ft by 23 ft and is approximately 8 ft deep. The stairs into the pool terminate on platforms which are a little over a foot from the bottom of the pool. This platform extends right across from one side to the other and is 3 ft in width. The pool is rendered water-proof by lining it with bitumen. There is also evidence that the steps were covered by wooden treads slotted into the sides of the stairs and fixed with bitumen. There are channels to bring water to the bath from a well or a channel cut from the river depending on the site. Arrangements for periodic cleaning of the bath are evidenced from the man holes made at some sites.

The Priest-King :

At Harappa a structure of 52 ft X 40 ft with almost 4 ft thick walls filled with mud brick forms a kind of public building. Here in one room was found a bearded head carved in limestone. It is 6.9 inches high. The rounded head and equally round face is extremely well carved and shows the upper lip shaven like many other representations known from Sumerian sites. The hair is bunched in a bun at the back. The beard is also cut in a round fashion to give the face an oval appearance. The ear is flat and formless. The eyes are slit like and designed for shell inlay. Bound on the forehead is a band with a circular amulet on the forehead. The band is tied at the back with V-like strands hanging from the back. A similar band is tied on the right arm. The shawl is decorated with engraved trifoil designs and these are also designed for inlay. There are few more similar fragments of statues recorded from this site. One of these is a 16.5 inches high seated figure of a man with his hands resting on knees. The depiction of the eyes and the decorations of shawl, presence of the forehead bands etc. in this man compares with both priestly and king-like attributes and hence the name Priest-King.

Lothal Dock :

Of the many surprising features of the Indus Valley towns the so called Dock found at Lothal is perhaps the most spectacular feature of an advanced civilization. This is a

rectangular depression 219x37 meters and is enclosed on all the three sides by fired brick walls. This is connected to the acropolis by a great platform of 249 m x 23 metres measurement which has been interpreted as "the wharf". There is also a spill way described in one of the walls which shows evidence of wooden sluice doors on grooves. Some authors have refuted this interpretation of the structure and have argued that this kind of structures are quite commonly known even today and are used as fresh water tanks in coastal regions which do not have any rivers in the neighbourhood.

Seals :

Harappa or the Indus Valley civilization is almost synonymous with the characteristic seals that have been found almost invariably associated with the urban centers. The bulk of the seals are prepared on steatite carved intaglio. Most of these are square in shape with a perforated boss at the back. A minority of these are cylindrical in shape or made on copper or even stone. A group of them shows such animals as water buffalo, humped bull, the Indian rhinoceros, elephant, tiger or gharial. There is another group of them which shows mythical animal forms or symbols like swastika, cross or loops. Finally, there are others which appear to be deity like figures sitting with animal horn as head dress. There are some showing a powerful man holding two hapless tigers by the throat. In one depiction a ram before the same horned figure is taken to indicate sacrifice. Almost all these depictions carry some inscriptions which are still awaiting an acceptable deciphering. One of the recent attempts of reading these scripts, which has gained fairly good acceptance, claims them to be a form of Proto-Dravidian script. It is believed that most of the writings are names of individuals.

Indus Script :

The decipherment of Indus script has been one of the biggest challenges in archaeology. Numerous attempts have been made and these include those brave ones done through computer aided method. Yet, we seem to be facing constantly new opinions. The latest among these is the one

done by Dr. N.K. Verma of Bhagalpur who discovered the Harappan scripts being used by Santhals of Chhotanagpur as symbols in their rituals even today.

The scripts are available in the form of pictographic signs on seals, tablets, pottery and stamps. They are both positive as also negative impressions. Although usually square to rectangular in shape these script bearing seals can also be circular or even cylindrical. The scripts occur with masterly carved miniature animal or human figures. In the recent years at Dholavira excavations, the scripts occur as large letters on a big board. Experts have identified nearly four hundred different characters in total and the evidences known till date seem to indicate that these characters occur in a series. A minimum of 5 characters and a maximum of seventeen characters are known to occur in a series. In some the characters are also repeated. Experts feel that these were written from right to left and since there are no evidences of two lines of writing occurring together it is hard to say if the second line was written from left to right similar to some known writings. The script maintains uniformity over vast area of spread and also the long span of duration of the Indus Valley Civilization.

Earlier some scholars felt that Indus script represents an ancient and emergent form of Indo-European or Sanskrit. Earlier Fairservis and Porpola opined that it is a proto-Dravidian script. Fairservis had opined that it is Proto-Elamite. S.R. Rao linked it with the Phoenicians while Langdon links it with Brahma. However the consensus still holds it as a proto-Dravidian script.

Trade :

The occurrence of lapis lazuli, silver, gold, lead and other precious stones and metals in the Harappan urban centres definitely indicates connection with places of origin of these noble materials, i.e. Iran, Afghanistan and the regions adjoining them. The occurrence of possible grain collection centres coupled with this positive evidence can be taken to indicate a possibility of trade. The uniform measures and scales can be finally taken to nail the above evidences and

demonstrate of the existence of organized and advanced trade. Once trade is accepted, Harappan urban growth and its widespread influence become explainable. Authors speculate that both river and maritime routes as also land routes were used by these traders. This leads us almost to the threshold of accepting the existence of a bureaucracy in Harappan civilization. The argument of a proper statehood having emerged on the Indus basin during this civilization rests mainly on the above set of logics.

The generalizations attempted in the above pages cover up many individual features present at each of the sites excavated so far. Consequently it will be worth our while to very briefly consider the excavation report of some of the well known sites in the pages that follow.

Kalibangan :

It lies on the left bank of the now dry course of the river Ghaggar (ancient Saraswati) in the district of Ganganagar in Rajasthan. It was excavated by Thapar from 1960 to 1969 (Thapar, 1973). Basically it revealed two periods of occupation.

Period I is designated to a pre Indus culture although even at this period the habitation area is fortified in the manner of the Harappan or Indus cities. The structures are all of mud bricks measuring 30x20x10 cm. The habitation units are built within this walled structure. Interesting evidence of cooking practice is demonstrated in the finds of earthen oven constructed both above ground as well as underground. Another interesting feature of this phase is the occurrence of cylindrical pits dug in the ground and coated with lime plastering. It is interpreted as tanks for storing drinking water. Ceramic types are varied and at least 6 different fabrics among them are described. Many of these fabrics show rows of cord impression used to decorate the exterior. The other finds include blades of chalcedony and agate, beads of steatite (disc), carnelian, terra cotta and copper. Bangles of shell and terra cotta, terra cotta objects like toy cart, wheel and bull figurine are the art objects known. Quern stones with mullers, bone points and copper celts are also recorded. The evidence of a ploughed field

located in the south-east of the settlement outside the town wall is another unique evidence of Kalibangan. The plan of the furrows and grids constructed have been taken to interpret the probability of cultivating two different cereals at the same time. The date of pre-Harappan, i.e. Period I is C 2450-2300 B.C. and is taken as comparable to Amri and Kot Diji.

Period II (Harappan Occupation) The structural pattern is totally changed with the citadel in the west and lower city in the east. The citadel area is roughly parallelogram in shape and measures about 240 meters north to south and 120 meters from east to west. It consists of two almost equal but separately structured parts. Both these parts indicate separate fortification wall surrounding the area. The fortification wall is plastered with mud from both outside and inside. The lower city is also parallelogram in plan and measured 240 meters from east to west and 360 meters from north to south. Street planning may be similar in pattern to the Indus sites but at Kalibangan they are not very regular. No evidence of regular street drains has so far been found. House drains discharge themselves into soakage jars buried under street floors. Other antiquities of this phase are chert blades (ribbon flakes), chert weights, terra cotta animal figurines, a terra cotta cake, typical mature Harappan pottery, terra cotta human head, bull, a graduated scale and ivory comb and bull made in copper. Besides the above two principle parts of the metropolis, there is also a third structure described. This lies about 80 meters east of the lower city. It has an impressive wall enclosing a room containing four to five 'fire altars'. The cemetery is located 300 meters to the west of the citadel. Three different types of burials have been described. The period of occupation seems to have come to an end around 1750 B.C.

Sothi. In Pakistan spread over the Cholistan region a number of Harappan sites have been recorded with different type of cultural features occurring in the base. Mostly these pre-Harappan levels are these days being referred to as Early Harappan i.e., these are no longer being considered outside the phenomenon of Harappa. However, Sothi has

still survived these unifying attempts. This is probably because this type of culture are also being described from Rajasthan, Haryana and Punjab. Hence the term used to designate it is "Sothi culture".

Sothi is situated near Nohar in Ganganagar district of Rajasthan. The site was excavated by A. Ghosh (1987). The fabric of the Sothi is red with a white base. Painting is executed with black colour but some times cord impression or rusticated surface is created by wet hand. It was argued that Sothi although seems quite different and distinct, must be parallel to early Harappa and continues at places upto mature Harappa.

Binjore I. Near Anupgarh near the Indo-Pakistan border this site was discovered by Dalal (1987). Besides a large number of terra cotta objects, chert blades, shell beads and copper objects, the lowest level, i.e. Period I at Binjore yields the typical red to buff ware with black painting and incised decoration. The radiometric date for this phase is 2700 B.C. Period II yields Harappan ceramics.

Bara. It is located a few kilometers away from Kotla Nihang on the upper course of the river Sutlej. The site yielded a new type of pottery which formed the basis of identifying a separate culture and naming it as 'Bara Culture'. The pottery has a distinctive painting which may have a root in the pre-Harappan traditions in the area. The earliest date of Bara is about 2000 B.C. and it survives till 1600 B.C.

Ropar. It is basically a later Harappan site in the Siwalik foot hills near the river Sutlej. It is described as showing three distinct culture phases beginning with late Harappans. Besides structural remains and the characteristic ceramic types it yields square steatite Indus seal, cubical chert weights, a copper celt and long chert blades.

Mahorana. It is situated in the district of Sangrur in Punjab. The lowest of the 3.10 meters deposit yields both pre-Harappan as well as Bara ceramics. The walls and floors of some of the structures are of mud brick. The antiquities described are pestles, stone pounders, terra cotta cakes, cart frames, wheels, bangles and bracelets. Beads of

steatite, faience and terra cotta are also there. Bone points, fragment of copper blade and wire shaped into a ring form the rest of the material.

Kotla Nihang Khan. It is very close to Ropar in district Ambala. The earliest phase is identified as Harappan. Excavation reveal structures of burnt bricks and some features indicating the presence of streets, drains and also a platform were described. The antiquities include typical Harappan ceramics, beads, bronze celts, chert blades and terra cotta objects.

Lothal. The site is situated 80 km. south-west of Ahmedabad near the head of the gulf of Cambay. The excavation reveals 5 phases of continuous occupation. It uncovered fortification structures constructed with mud and mud bricks. The citadel houses both private and public buildings. The residential area shows series of rooms each with brick paved bath and underground drainage system with sifting chambers and cesspools. On the eastern flank of the city is the dockyard which has been described earlier. Both at the ware house or granary and the dock seals of Persian gulf have been discovered. Besides the typical Harappan ceramics some other pottery types are also recorded here. These are micaceous red wares, black-and-red wares, and coarse grey wares. The other antiquities recorded are seals, cubical weights, chert blades, disc beads, copper objects (drill, chisels, fish hooks etc.), ingots, bone pins, etched carnelian beads and terra cotta objects. The life span of this occupation is estimated as 2300-1600 B.C.

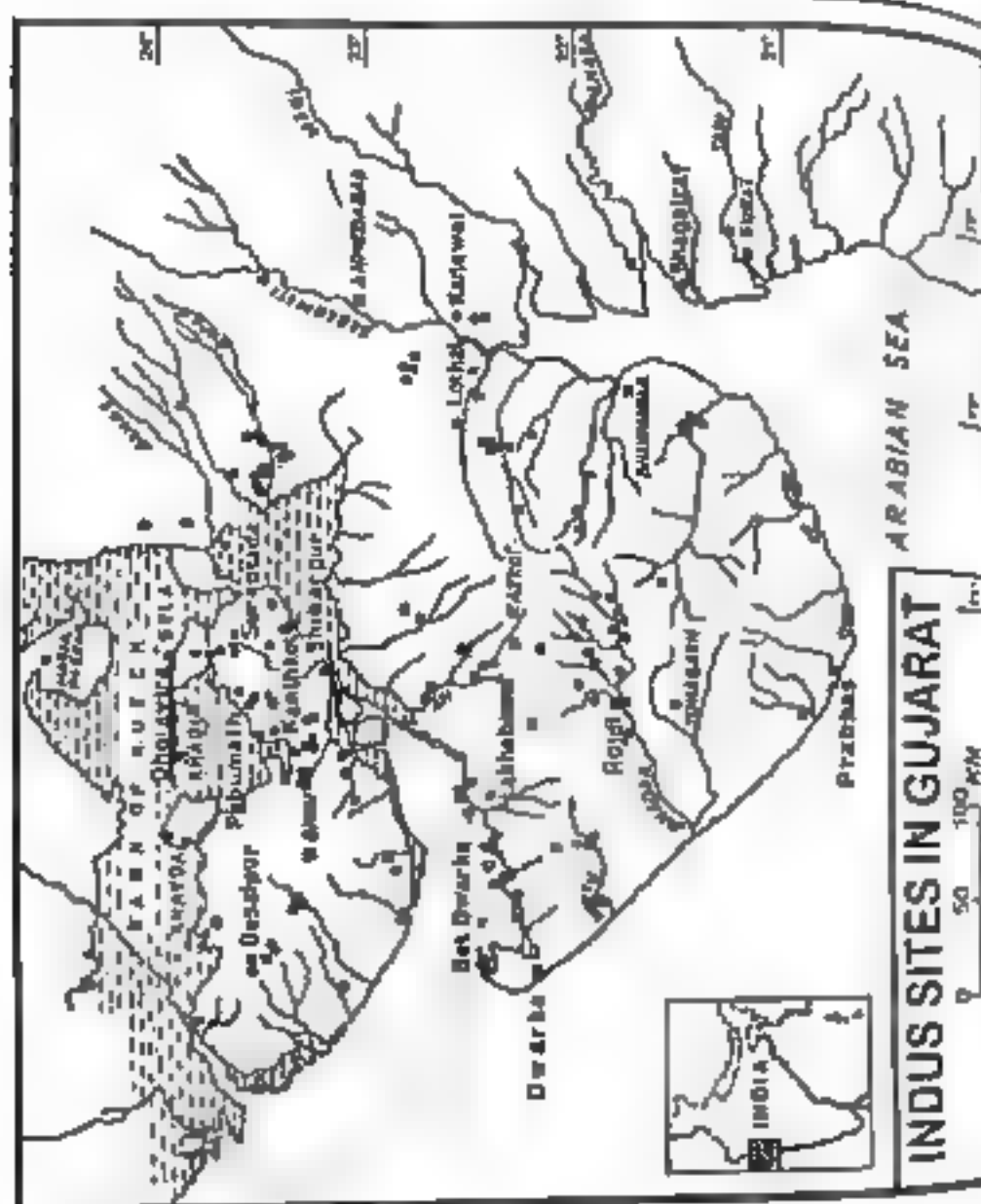
Dholavira :

Ever since the basic characters of Indus cities were tentatively worked out on the basis of the major excavations at Harappa and Mohenjo-daro, more and more sites are coming to light. These are both of varying nature as also extension. The sites on the western extension across the Indus are probably as variant in their specific details as those known from the eastern extension of the Civilization from Haryana, Gujrat and Rajasthan.

One of the largest known Indus sites in the world has now been discovered in a modest village in Bachau taluka of district Kutch in Gujrat. It is situated on the north-western corner of the Khadir, which is a large island surrounded from all sides by the Great Rann of Kutch. It was discovered way back in 1967-68 by the then Director General of Archaeological Survey- Shri J.P. Joshi. It is being excavated by Shri R.S. Bisht, now for almost a decade. The excavation has confirmed a stratigraphic sequence of pre-mature and post-urban Indus cultures through an enormous regular occupational deposit of 12 meter thickness.

The first occupation of the site was by a population similar to the Amri type Pre-Harappan group, who have left behind a 60 to 70 cm deposit. They were familiar with the use of moulded bricks measuring $36 \times 18 \times 9$ cms, and also the manufacture of wheel-made pottery of diverse fabrics decorated in different styles. They had also acquired technical knowledge of copper working and stone dressing. A huge mud-brick fortification wall, extant to a height of 6.30 meter was found around the dwelling area. It was successively plastered with bright clays of white to pink hues. The Harappans came there quick on the heels and used the same very wall, after a century or so, the Harappas added from inside a 5 meter wall with an elevated walk to the existing defence.

For over 9 meters deposit which is indicative of a considerable duration, the Indus culture maintained its classical character in all spheres. The decline coincides with the arrival of a new set of people- quite probably from Sind. They continued the classical traditions for some time and carried out repairs to the defensive system with inferior workmanship and unaesthetic changes. Decline became more rapid probably following the desertion of the city by the elites. After a short desertion a new group of people appeared on the scene. Unlike their forerunners, they lived in circular stone houses which are still in vogue in Gujrat and are called Kudas. Surprisingly these new groups are found to continue with the same ceramics and other items which their predecessors had made and used.



Courtesy: Archaeological Survey of India

It is apparent that much thought and imagination has been used in the planning and construction of the city. The city has been planned in accordance with the magnetic orientation of 6° off the cardinal direction. Such an astronomical precision as this is not only astounding but also indicated high scientific knowledge of the Harappans. The city proper was conceived as a perfect rectangle measuring 770 meter East-West and 616 meter North-

South (a ratio of 5 : 4). This is bounded by a massive mud-brick masonry wall. Inside this wall there are three principal divisions which on the basis of their relative position have been named as **Citadel**, **Middle Town** and **Lower Town**. Significantly the first two divisions, i.e. the **Citadel** and the **Middle Town** have their separate and yet inter-connected fortification system. The **Lower Town** has no such fortification but all the three areas are within the general fortification.

The **Citadel** contains two conjoint subdivisions both secured by walls. The higher one which is in the east is the most carefully constructed and zealously guarded by thick and high walls which are opened only by two gateways. Each of these are furnished with a flight of steps leading to a long passageway flanked by two elevated chambers and a lofty terrace in the front. Each of the two side walls of the sunken passage way supports a set of highly polished blocks at either end and an equally polished pular base shaped like an hourglass in the center. The north gate is the most majestic and elaborate of the two. It overlooks a broad and open space which separates it from the fortified **Middle Town**. Interestingly this open space is found nicely leveled and floored successively during the length of the mature phase. It appears that this space was used for royal, social and/or religious congregation presided over by the 'supreme authority' seated in the chamber of the north gate. Such a design of a Harappan gate as well as use of highly polished architectural members is till today without any known parallel.

The finding of an inscription consisting of 9 large characters may indeed be called the discovery of the century. Each of these characters is made by arranging several pieces of milk white rock, mineral or Paste of a crystalline nature. Each of these letters measures 37 x 27cms. This epigraphic 'sign board' is imbedded in the structure on the north gate. This is another unique Harappan find not recorded anywhere till date.

Finally, the third and perhaps the most significant feature of Dholavira is the evidence of a large water reservoir

provided in the heart of the castle. This is 13 meters wide and has a length of more than 35 meters. A fine net work of drains is used to collect rain water and lead it to this reservoir. Water collected at several spots which are connected with polished water chule into deep chambers, a drain issuing from the chamber led it to the reservoir. Many of these connecting pipes are of terra-cotta.

Other important finds include microdrill bits made out of hard stones, seals, seal impressions on clay and one bronze figurine of an animal. Seals bear short epigraphs in the Harappan script and many of them are engraved with unicorns and other animal forms. Beads of semi precious stones, gold, copper, shell, steatite, faience and clay objects, usual copper objects including a pin with two spiral heads, bangles of stones, terra-cotta models of cart frames, wheels, animals, gamesmen, triangular cakes and a variety of stone querns, grinders, rubbers, polishers, pestles and mortar used for domestic as well as for manufacturing purposes are the other objects recovered.

Dholavira opens an entirely new avenue of inquiry about the connection of the Harappans with the 3rd Millenium B.C. occupations from Oman and Yemen in the Arabian coast land, and hence possibly also with the African continent. Cultivation of millets in these Arabian sites might have subsequently influenced the Indian groups of later Chalcolithic occurrences. At least the arrival of Ragi and Hulgi in the Deccan Chalcolithic need not now be taken as a parallel evolution with Africa.

Rangpur. It is situated in the district of Surendranagar in Gujarat and is situated on the bank of the river Sukha Bhadar. Excavations reveal 3 periods of occupation. Period I is designated as Pre-ceramic Microlithic; Period II as Mature Harappa and Period III characterized by Lustrous red ware. The Harappan phase is further divided into 3 sub phases named as IIA, IIB and IIC. Period IIA yields almost all Harappan wares in addition to a red micaceous form and black-and-red ware. Cylindrical carnelian beads, lenticular agate beads, disc beads, chert blades, gold, cubical weights, shell bangles, copper pins, bangles, rings and cells are the other antiquities recorded from this period. Period II B

marks a degeneration of many typical Harappan features. No structures are encountered here. Period IC is some new forms and fabrics. The cylindrical perforated jars totally disappear in this phase.

Period III yields large quantity of Lustrous red ware, terra cotta figurines, beads and shell bangles. The note worthy feature is the finding of a terra cotta horse representation. The life span of the site is 2000 to 1500 B C.

Rojdi. It is situated near Rajkot in Gujarat and lies along the river Sukh Bhadar. There are three occupation phases described. The oldest deposit is designated to the post urban phase of Harappan culture. This period I is subdivided into IA, IB and IC. These phases show mud walls, mud bricks and other structural remains of poor quality. Yet the antiquities found from this period are typically Harappan. Red and Buff ware, chert blades, cubical weight of chert and agate, beads of carnelian and terra cotta, copper objects and inscribed pot-sherds are the Harappan material found.

But the joint excavation of Indo American team (Possehl et al. 1983) of the site revealed large amount of additional material as well as radiocarbon dates. This will indicate that most of the Rojdi occupation occurred during the Urban phase of Harappan culture in the Indus plains. A provisional analysis of the pottery has shown at least 3 different phases of ceramics. The earliest or Rojdi A appears to be similar to Rangpur. Rojdi B is attributed to late urban phase of Harappa and Rojdi C is compared with early post urban phase. The radiocarbon dates for Rojdi A and B are estimated to 2190 to 1620 B C. (Possehl, 1992). Possehl states that, "The material inventory of Rojdi A and B is clearly not of the mature Harappan, at least as we know it from Mohan jo-daro, Chanhudaro and other sites in Sind or even Lethal and Surkotada. Rojdi and many other sites in Saurashtra and possibly north Gujarat as well, appear to represent a new regional expression of the Harappan urban phase." (p.485).

Prabhas Patam. It is situated on the mouth of the Haryana on the coast of Saurashtra. Excavations revealed 5 cultural

levels at this site. The older three phases are attributed to Chalcolithic phase while the younger two phases belong to Iron Age. Period I, which is further sub-divided into sections A and B is characterized by un-glazed burnished grey ware. The slipped and black and-red ware. The slipped and red slipped and black and-red ware. The slipped and red painted designs resembled late Harappan ceramics. Microblades and segmented flinted beads are the important artefacts of this period. Period II represents a *major* grey coloured painted pottery and this has been termed as Prabhas Ware. The houses in this period are rectangular and are built with local malholite rock. Period III is marked by the appearance of lustrous red ware. The period has some structural remains. A steatite seal which is engraved on one side with seven stylized deer and the obverse with five deer forms a significant find of this period. C-14 date for period I is 2400 B.C., Period II covers circa 2000-1700 B.C. and Period III is estimated at 1500 B.C.

Burkotada. It is another important Harappan site lying in the district Kutch of Gujarat and is about 160 km. north-east of Bhuj. Three distinct phases are identified in the excavation. The earliest phase or IA is established on virgin soil. The citadel area is 60 x 120 m and is prepared with rubble and mud bricks. The ceramics includes typical Harappan wares in addition to black-and-red ware and unpainted red ware. A red slipped polychrome ware with cream coloured slip along with reserve slip surface treatment is another significant type. Beads of steatite, lapis, carnelian, faience and terra cotta are fairly common. In addition rings and bangles of copper and spear heads of copper are also collected from this period.

Period IB is characterized by renovation of citadel wall but no substantial changes in the construction is seen. Further, there seems to be a reduction observed in the internal living space. A painted coarse red ware makes up 70 per cent of the total ceramic collection of this phase. Black-and-red continues but in a reduced frequency. The other antiquities recorded are beads of agate, carnelian, steatite and terra cotta and a heavy copper celt.

Period IC is marked by a white painted black-and red ware although Harappan wares continue along with the coarse

red ware of IB. In this period there is a complete reconstruction of the citadel and the lower town is also added. The defence wall is remodelled with bastions added at points. The other important finds include a terra cotta seal with Indus script. A large collection of horse bones were also made from this phase. The proposed date for the total life span of these three sub-periods is estimated to be c.2400 B.C. - 1700 B.C.

Desalpur. The site is located on the bank of the river Marai in district Kutch of Gujarat. Period IA is characterised by evidences of Mature Harappan phase. Fortification built with stones are recorded. The ceramics comprises of cream-shipped bichrome ware, white painted black and-red ware and some other red ware varieties. The ruins of a lower town also seem indicated.

Bhagatray. It is situated in district Broach by the side of the river Kim. Two cultural phases have been identified in the excavation. The ceramics having similarity with Harappan red ware and buff ware are the main and dominating antiquities of the site. The usual types recorded are disk-on-stand, heavy jars, dishes, bowls with handles and basins. Chert blades, disc beads of steatite biconical beads of carnelian and faience, a terra cotta bull figurine and few indeterminable copper objects form the other finds of significance.

Padri. In the recent excavations (Shinde and Thomas 1993) another Harappan site has now been added from Gujarat.

The site called Padri is situated in district Bhavnagar. Here a clear Pre-Harappan phase is identified below the Harappan layers. The brief excavation report shows important structural remains of mud and mud bricks and also stones. Fire pit, permanent domestic hearths and several living quarters are unearthed. A significant find among others is a 14 cm. long fish-hook with barbed point at one end and a loop on the other. It weights 45 gms and is surely not fabricated for shallow water fishing. It can, therefore, be decidedly taken to indicate deep water marine fishing.

Nagwada. The site is situated in the Rupen estuary of north Gujarat. The site reveals a pre-urban phase of Early Harappan and following this materials of Mature Harappans occur. The site also yielded a burial which contain pottery with hard pink to red fabrics. The shapes recorded are very similar to the types known at Amri during its pre-urban phase. The mature Harappan phase include a large amount of black and-red ware. The finds also include a stamp seal with the Unicorn motif. The earliest phase of this occupation is dated to 3000-2600 B.C. (Possehl, 1992).

Nageswar. It is small but important site at the westernmost tip of Saurashtra not very far from Dwarka (Hegde et al 1964-85). The excavations reveal material indicating a Sindh Harappan character. It would appear that the people of Nageswar were given to gathering shells which were used profusely for making objects like bangles, beads, ladles and spoons. Many of these also show inlay works. The site has two structural phases indicating sporadic occupation occurring between 2500 to 2000 B.C.

Banawali. It is a major Harappan site situated in Hisar district of Haryana. Unlike other Haryana sites Banawali shows more proximity with Rajasthan. It yields the three fold sequence of Pre-Harappan, Harappan and Late Harappan in the Kalibangan pattern. The mound stands on the bank of the ancient river Saraswati.

The pre-Harappan phase is represented by 3 meter thick debris and is marked by all the six different fabrics known from Kalibangan ceramics. A barrant sized bricks, kiln, burnt bricks, 2 meter wide brick-on-edge pavement, ruins of houses, several hearths and fire pits etc., characterise this phase. The other important antiquities of this phase are points and awls of bones, microlithic blades made on chalcedony, bangles of terra cotta, shells, copper and faience and beads of steatite, silence, shell, bone and gold. Stone weights and terra cotta animal figurines are also recorded. The pottery types consist of vases, perforated vase, beakers, basins, *handis* with a-profile and dish-on-stand. Another interesting find is a wheel in which a canopied cart with spoked wheels is depicted.

Mature Harappan phase show distinctive fortified and planned township showing two adjoining parts and a seven meter thick wall separating from the citadel area and a residential annexe. In the residential area the houses are prepared by mud-bricks. The roads are more in the manner of radius within a circle than the original Harappan plan of rectangular bylanes. Besides ceramics other typical Harappan finds are chert blades, spear heads and arrow heads of copper, bangles and beads, plough share and animal figurines, steatite Indus seals bearing Indus script, beads of lapis, etched carnelian, and copper with gold foils.

The remains of the Late Harappan deposit are found outside the main walled town. The deposit yielded number of pits containing pottery of different fabric and decoration. The radio-carbon date of Banawali ranges from 3103 ± 100 to 3930 ± 190 .

Having gone through some of the spectacular features of this widespread civilization we might summarize the culture as follows:

1. The Indus valley people were drawn from some of the pre-Harappan cultures in the Punjab plains around 2300 B.C. These pre-Harappans had strong links with other cultural centers farther west. At Kalibangan a similar pre-Harappan population must have already spread around 2500 B.C. At Burzahom the Chalcolithic layers are not without similarity in individual material cultural objects with these pre-Harappan Afghan cultures. Why and how they organized themselves to colonize the fertile plains of Indus and Ghaggar would perhaps never be known but that they did organize into an enormous population and colonized the area into the world's oldest and largest civilization is an archaeological reality.
2. A spectacular success in agriculture must have provided the initial thrust which pushed them into an advanced form of administration. Grains as state levy were collected and stored in the granary under the direct supervision of the men who stayed in the quarters above the great bath. The indispensability of

bath for these people and the added privacy of individual partitions provided in the bath led many authors to believe that these were meant for priests who used to take bath twice a day in the manner of Hindu Brahmins and used to conduct their rituals in the partitioned compartments. These priests evidently were also the rulers as they housed themselves in direct proximity of the collected grains. It is believed that this grain was slugged for trading as there occur outlets for lowering loads directly from the granary into boats waiting below. The soldiers were perhaps employed both for defence as also for various kinds of labour. The city situated little farther (usually lying east of the citadel) must have housed battery of ministers and clerks to run the social system. It is possible that artisans like bead-makers, metal-smith, etc. were also allotted houses in this city. The halls - referred to as either schools or centres of community gathering - may have been used as state worshipping centers.

3. The town-planning and architectural excellence of these city structures seem to be quite incredible for that remote period of time in which they occur. Every room is floored and every house is equipped with a toilet and bath room. The streets, though not paved, are planned exactly at right angles to each other. A paved drain runs along the length of the streets. The chutes from individual quarters are linked to this drain. At small intervals these drains are connected to soakage pits. The houses were definitely raised to another floor above ground and had in many cases their own well situated in them. These show features of a complete planning of all details before actual population moved in them. The defence walls are another example of this perfect planning. Evidences of reinforcement of the defence wall show a constant architectural vigil. At Surkotada another interesting feature recorded is the possibility of big wooden-trunks erected at the corners of the streets - as if to prevent a fast moving cart from damaging the building corners while negotiating the bend.

4. The copper and bronze objects, although limited in their typographical varieties, are uniformly found in almost all these far-flung sites. This is equally true of the seals, the beads and terra cotta objects. The uniformity of technique, casting and motif repetition leaves no doubt that a proper professional group must have been maintained within the society. Likewise redistribution of produce (both agricultural) and manufactured goods must have been quite efficiently maintained in order to give rise to this remarkable homogeneity over such a vast region. Art objects on terra cotta, stone and in some instances on the metals throw some ventilation to the nature of the society that could attain such heights of organized urban centres. Precious metals and stones on the one hand and chert blades (ribbon blades) on the other seem to indicate a stratified system. This is further substantiated by varying size of living quarters, partially incinerated bones stored in big jars outside the house for some and burials for others and facilities within the living quarters. Since an exact picture of the burdens and privileges of the inhabitants of these houses will perhaps never be known to us, the nature of the statehood for us will remain merely as a possible hypothesis. Labour organization to cut wood and distributed to the potters or brick kiln workers, to man transport for internal distribution and dozens of other specific functions cannot be visualised without the possibility of a bureaucracy. Thus, a statehood of some kind can be visualized. Alternately one can visualize a complex tribal structure based entirely on kinship alliance of a federal nature. (chiefdom) This alternate would seem more congruous with the situation of all the Afghan-Baluchi sites spread in the west. Further, this can also take care of the incongruity of a statehood rising suddenly at one place and not in the neighbourhood.

Finally, we must add that both cotton seeds (and hence textiles) and horses were initially claimed to have been domesticated by the Indus Valley people. Recently cotton

has been decidedly proved as existing (from Mehargarh) in this region but existence of horse has yet to be confirmed by specialists. Thousands of bones from Surkotada claimed as horses might as well as be wild asses still found in the region. In a very recent study not published so far it appears that horse was identified beyond doubt at Surkotada.

Post Harappan Spread :

Around 1900 B.C. one can see a distinct change in the Harappan characteristics at the Harappan metropolitan sites. At Chanhudaro, Jhukar and Amri one can observe this shift quite clearly. A new pottery style emerges and the township shows a degeneration when compared with the architectural excellence of the earlier period. The new type of pottery with buff colour and red to cream slip is often referred to as the Jhukar group. The pottery is ill fired, coarse and painted mainly with geometric motifs in black or purple. This is further followed by another group which is referred to as the Jhangar group who take to an entirely grey or black pottery. Similarly at the citadel mound in Harappa the change is noted in the form of a new element which is referred to as Cemetery II pottery. Besides the pottery there is a new feature of urn burials recorded in this phase and this led to the belief of an exogenous intrusion. The ceramics are a red ware elaborately painted with black paints. Motifs like peacocks, bulls and pipal leaves occur although in quite different combination, e.g. leaves sprouting from horns or humps of bulls, tiny human figure lying supine in the stomach of peacocks etc. In the forms which are new one can see the footed vessels with narrowed and cylindrical necks, coconut shaped ringed jars with lids and carinated jars.

The situation in east Punjab and Haryana is no less interesting. Here bordering Rajasthan (in Haryana) occur several sites, which have mainly a rural character and only influence of Harappan ceramics, between 1900 to 1200 B.C. These have been given such names as Siwal A, B, C & D or Mitathal depending on the region one is dealing with. There are some mud-brick structures also found in some of the sites but these do not compare with either Kalibangan

(Rajasthan) or Bannwali (Haryana) - both being Harappan metropolis sites.

Siswal. The site lies on the left bank of the now dry Chautang (ancient Drishadvati) about 26 km. west of Hissar in Haryana. Excavation in this site was done by Surajbhan. The mound reveals two cultural occupations termed as A and B. These are basically being classified on ceramic types.

Siswal A: It is a red ware with geometric decoration of black paint. Angular-walled bowls, globular jars, small dish-on-stand, and some S-shaped jars are the usual types attributed to this period. Generally this falls in the Pre-Harappan category in the Kalibangan scale.

Siswal B. Most of the Mature Harappan types are repeated including both shape and decoration.

Siswal C: Mostly all Mature Harappan types disappear. The distinctive types are carinated bowls, dish-on-stand and jars with high collared rims. The decorations are mainly geometric and at instances seem to be carelessly executed. There are some similarities of this pottery group with cemetery-H type pottery as well.

Siswal D: It is marked by the emergence of Painted Grey wares with other Siswal forms.

Mitathal :

The mound of Mitathal is located along the dried up course of the Yamuna, near Bhiwani in Haryana. Excavation was carried out by Suraj Bhan, and two cultural phases have been recorded. Period II is further sub-divided into two sub-periods IIA and IIB.

Period I yields few Harappan wares, which are comparable to Siswal B ceramics. Most brick structures were exposed. Period IIA yielded typically Harappan pottery, household objects and dwellings. The mud-bricks of the size 40X20X10 cm are similar to those of Kalibangan Period II. Other finds include long chert blades, terra cotta cakes and toy cart wheel of Harappan type, cubical chert weights, etc. Period IIB is marked by a general impoverishment of Harappan materials. Ceramics are lesser in variety. Both treatment

and decoration on them are poorer in quality, although this period also yields terra cotta toy cart wheels and wheeled toy animals of earlier phase. The other objects found include a flat copper celt, a wide splayed axe and bangles. Harappoons and rings of copper found in an earlier occasion are also linked to this phase. (Thapar 1985.)

Bhagwanpura. This site is situated in district Kurukshetra in Haryana. It was excavated by Joshi. Two cultural phases are described. These are the Late Harappans or Post urban phase of Harappa and a younger phase.

The earlier phase is represented by red ware (both plain and painted), grey ware, terra cotta bulls, toy cart wheels, and copper rods. Bone points, terra cotta bangles and beads, faience bangles and beads of semi precious stones are other finds of significance. The houses were constructed atop mud platforms- probably to protect them from the eventuality of flood. A terra cotta seal with Indus character inscribed forms another important evidence. The later phase is found interlocked with Painted Grey ware.

Daulatpur. It is another late Harappan site located in the district Karnal of Haryana. Again two phases are described almost in the same pattern and with same kind of cultural features as in Bhagwanpura.

Hulas. Harappan intrusion further east into the Ganga-Yamuna doab during its terminal period is evidenced by few very interesting occurrences. Hulas is one of these and is situated in the district Saharanpur in western U.P. The site records 5 cultural phases of which Period I is designated to Late Harappan, Period II to painted Grey Ware and the rest to successively further younger periods. Period I yields typical Harappan painted ceramics, solid mud brick structures. Kiln burnt bricks, circular hearths and other minor structural remains are described from this phase. Terra cotta beads, animal figurines, cart wheels, faience beads, bangles, pots, beads of agate and fragments of copper bangles are the usual antiquities of this period. In addition to these bone points, stone querns and pestles are objects of significance recorded. Period II is a PGW phase and also yields iron slag.

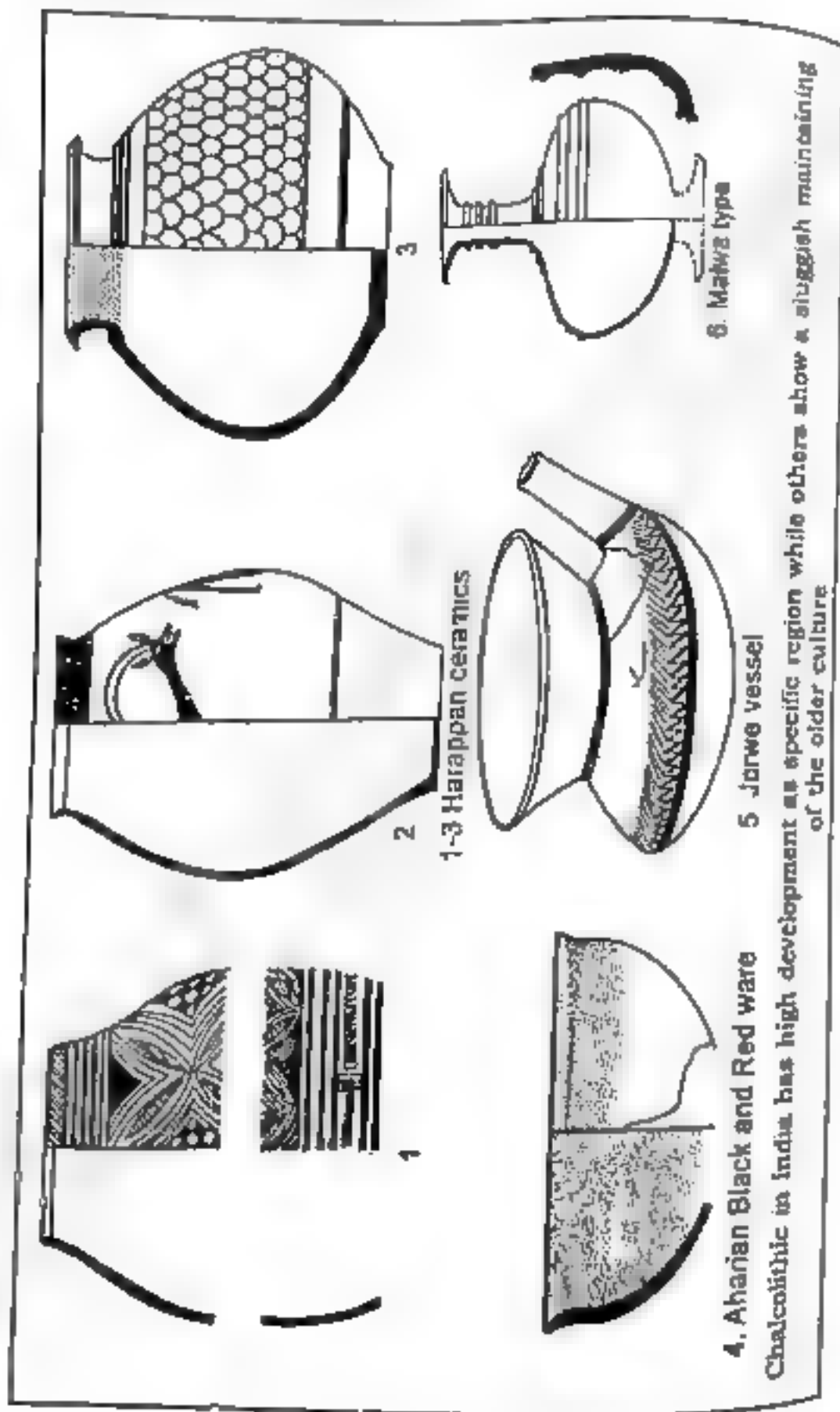
Alamgirpur. This is situated in Meerut district and is near the river Hindon. Four cultural phases are identified here. Period-I is designated to Post Urban phase or Late Harappan period. Excavation revealed structures of burnt bricks. The ceramic content is poorer than Harappan both in technique as well as shape and decoration. It is quite likely that Alamgirpur evidences rise out of new and entirely local ceramic tradition which might have risen from a Late Harappan base.

Bargaon and Ambakheri. Both these sites are in Saharanpur district of Uttar Pradesh and are not very far from each other. Harappan pottery, chert blades, terra cotta cakes, terra cotta toy carts in addition to faience bangles and stone weights clearly indicate its Harappan affinity. Some ceramic types at Ambakheri seem to have an affinity with the O.C.P. (Ocher coloured pottery. It is believed that late Harappans were immediately followed by O.C.P. in west U.P. and this still is pre-iron in cultural status).

It is interesting to note that in these sites the Harappan element does not show as sudden a disappearance as is noted in the various metropolis. Looking at the few carbon dates available one can easily surmise that the change was more sudden in the urban centers than in the rural hinterlands which had some kind of contact with the former. This is typical of a situation where the politico-nerve is centered within the city. At this juncture we might briefly enumerate various reasons of the end of Harappan civilization as claimed by various experts on the subject.

One group of scholars argued that the Indus was suddenly choked by a mud extrusion caused by tectonic movement. Silting of the river caused havoc with agriculture and hence the economy. Another group of scholars felt that Aryans invaded these regions and plundered them to establish their own kind of culture.

Yet there is a third group who feels that the Harappan civilization itself was a product of Aryan culture who in the face of increasing aridity in the Indus plain slowly migrated to the Gangetic basin.



It is very important at this stage to mention that from the archaeological record one has no methodological possibility of reconstructing what language was spoken. Further, it is difficult to demonstrate that fire was not worshipped by any Chalcolithic culture. So it is better to abandon this much misused word (Aryna) once for all from the books of archaeology. Climatic shift argument recently offered from the Ghaggar source seems, at the present state of our knowledge, as most convincing. It proposes that Ghaggar had the possibility of releasing huge amount of water into the Indus when most of the upper tributaries feeding Ghaggar were active. Either a tectonic movement in these unstable hills or a gradual climatic shift rendered Ghaggar dry and shifted the feeder tributaries to Chaulang and finally to the Yamuna. Indus was naturally reduced in both strength and extent. This must have caused a decline in the economy and hence fall of the cities. It will not, therefore, be surprising if in the rural epi region such changes are hardly noticeable. The Saurashtra region, unlike most of East Punjab and Haryana, demonstrates a fairly good concentration of an indigenous population before, during and after the Harappans in a vertical development without break. Rice, millet, sandal-wood and favourable cotton varieties of the region might have attracted the Harappans to this region, but their city collapse (Lothal, Surkotada or Desalpur) could not substantially affect these non-Harappans. These are best exemplified at Rangpur, Somnath (Prabhas Patan) and Rojadi. Radio-carbon dated indicate this area being colonized from 2400 B.C. to 1400 B.C. - almost parallel to the Harappan development. Around 1900 B.C. the post-Harappan features start consolidating. By 1400 B.C. we have a completely different regional culture established.

The pre-pottery level (Period-I in Rangpur) shows a large number of microliths with probably mud houses which evolve into (Period-II) mud and burnt brick houses and drains. A micaceous red ware, buff ware and a coarse grey ware are introduced, along with these occur several typical Harappan artifacts. Soon, a new Lustrous Red ware is introduced (Period III). Bowls, jars and dishes are prepared in this specific fabric. Black and Red ware and carinated

vessels become a dominant theme at this stage. Segmented faience beads are quite common throughout this phase. At Somnath a curious feature of 3.8 X 2.4 meter rectangular house prepared by stone is found. Six double-roofed houses prepared in this fashion and enclosed by a wall have been identified as a market. Steatite seals with sheep engraved on them and a gold cup ornament are some of the other features of these Saurashtra Chalcolithic sites.

The decline of Indus Valley Civilization

Generation of Archaeologists have come out from the schooling of an 'Aryan invasion theory' to explain the decline of Indus Civilization. It was believed that the 'Aryans' coming by way of Afghanistan invaded north west India and overthrew the walled cities. Based on several Indian literary sources this event was believed to have taken place around 1500 B.C. Indirectly evidences of sorts found in the two sites at that time (Mohenjodaro and Harappa) were linked with incidents and characters described in the *Rigveda*. Thus, Indra who is described as the destroyer of forts (Purandara) is shown as having destroyed the fortified Harappan cities in order to earn that name. Layers of ash and evidence of fire were likened to the description of Indra's destroying Dravidian castles by putting them ablaze.

Obviously these inferential theories had no or very little conclusive archaeological evidences to stand on. Absence of proper dates for many isolated surface finds from further west prevents us from ascribing confirmed dates for many events in the Indus where strikingly similar objects have been recovered. Likewise a lack of our understanding of the true functioning of the Indus society acts as one of many such hurdles. Both Gordon Childe and Sir Mortimer Wheeler, despite these hurdles had continued to maintain that the decline of Indus Valley is linked with the 'Aryan' invasion of these regions.

Marshal and Mackay, who has conducted the main excavation at the two major sites had originally commented that repeated flooding of the Indus had eventually led to the destruction of the civilization. Cities must have been deserted during these devastating flood and this must have

made it easy for the Barbarians to take over. It still does not explain why the decline of the civilization as observed in the northern sites is not similar in kind when compared with the same in Saurashtra. But at least this was based on archaeological evidences such as reinforcement of the walls and river silt depositions in the site. Recently Lambick proposed a slightly modified theory of repeated shifting of the river basin. Raikes has proposed an elaborate argument of another modified process of sudden flooding and inundation of the entire region. According to Raikes a massive tectonic movement caused the formation of a dyke like feature across the Indus a little south of Mohenjodaro. This created both siting and inundation of the areas north of Mohenjodaro and dried off the river below this site. Thus, in either direction it caused disaster to both cities and their primary economic base. But Raikes' theory met with strong opposition from most of the archaeologists working in the field. According to these critics no such evidence of tectonic activity nor any kind of dyke structure large enough to stop the river flow is known or reported so far.

If by the term 'Aryan' one were to understand the culture which has harnessed horses to chariots and those who spoke Indo-European language besides having fire worship etc., we can scarcely hope to demonstrate these characters from archaeological ruins. (with the exception of few claims made recently) It is true that the earliest reference of war chariots is known from Samsi-Adad (1800 B.C.) in north Syria but, for the Harappan sites, we are yet to demonstrate the presence of horse conclusively. In the Boghaz keui tablets dated to 1380 B.C. referring to a war treaty of the Hittites one can see the mention of such Rigvedic gods' names as *Mitra*, *Varuna* and *Indra*. But again this is nearly 400 years later than the date of the end of Indus Civilization. Under the circumstances as above an "Aryan invasion" as a direct causative force for the decline would not seem very tenable. This would mean that the arrival of the Indo-European speakers and the cause of the decline of Indus Valley have to be treated as mutually exclusive phenomena separated by time.

Foreign Invasion

Piggot (1950), Gordon (1958) and Wheeler (1947) have separately supported a foreign invasion theory to explain the rather abrupt decline of Indus culture. The invasion model is sought to be supported by the fact that the defense wall was periodically reinforced at the urban sites and also the ancient texts, particularly (Rig Veda) mentions of similar invasions and conquering of cities and towns by the Indo-Europeans. Bronze weapons and other kinds of Indo-European associated traditional weapons have been found on the surface of Urban Harappan levels. The invasion theory seek support from these archaeological evidences. It was difficult to support this theory primarily because almost all scholars agree that a decline starts much before the accepted date of Rig Veda. Waves of nomads and marauders must have been coming from central Asia periodically and a defence against them was done by the walls. However, the supporters of invasion theory have their own body of evidences. Wheeler, for instance, has referred to the discovery of skeletons from the topmost level at Mohenjodaro with signs of violent massacre. Similar evidence have been found in HR area where a group of 13 skeletons of males, females and a child were found in state which suggests their killing one after another. Dales and Raikes argue that not all the skeletons at Mohenjodaro belong to the final phase. There are no signs of burning and destruction and there were no skeletons found in the citadel area which was the main center of power. In his later writings Wheeler became less emphatic about this theory and today it is more or less discarded.

Climatic change

In early 1950s both Wheeler and Piggot also supported this theory. As early as 1930s Marshall and Aurel Stein had opined that the climate of this region during the Harappan period was wetter than today and it was the slowly increasing aridity which caused a failure of the economy and hence the civilization. They collected several archaeological evidences to support their theory but these were not conclusive because these evidences could be

explained with alternative causes as well. Recently Gurdeep Singh studied the palynological spectrum of the Rajasthan salt lakes and opined that a causal relationship exists between increased rain fall and the development and reduced rainfall and decline in the Harappan civilization. Singh could not get a large support from the archaeologists.

Tectonic phenomena

This theory is basically derived to explain the water deposited layers encountered at Mohenjodaro city area. Amri and Chanhudaro also produced similar evidence. It was argued that the river Indus was flooded suddenly because of tectonic phenomena. But Kalibangan or for that matter the Saurashtra sites show no such evidence. In 1952, M. R. Sahani, a geologist and palaeontologist studied the silty deposits of Indus plain and suggested that flood in this region was not a case of mere overflow of the river but was probably an event more than that. Thus, the tectonic theory was once again sought to be substantiated. This theory was more elaborated by Raikes (1964, 1975) and Dales (1966). They carried detailed investigation of the river bank. At places Raikes record silty deposits as high as 30 feet above ground. According to him the deposits are of still water origin and that these conditions were caused by inundation of the Indus water by uplift. Thus, the dam and lake hypothesis of M. R. Sahni was substantiated. Dales, during his investigation observed that the early Harappan sea ports were now as far as 30 miles inland suggesting thereby that the coastline in this part of Pakistan has risen greatly within the last 4000 years. Lambrick and Posschl (1967) have rejected the theory. According to them still water origin of the silts could not be conclusively demonstrated and also evidence of tectonic up lift of the river in the geomorphology of the Indus basin is not demonstrable.

Hydrological changes

For the abandonment of Mohenjodaro Lambrick (1967) suggested that the east ward shift of the river Indus caused the periodic inundation of arable land in and around the city finally leading to loss of agricultural product. This

theory could further argue that the focus of Indus civilisation was the new channels of Ghaggar-Hakra.

In this regard the recent analysis of this issue by prof V N. Misra will appear to be extremely appealing. In the recent years palaeo- channel studies have demonstrated that several Himalayan flows used to discharge huge quantity of water into the Ghaggar, which in turn used to flow into the Indus through the Sutlej. These feeder channels of Ghaggar have been demonstrated to have changed progressively towards the south east in the past. It is true that we have no dates for these events, but we have evidence that the main feeder channel had changed its earlier course and shifted to Chautang. This did finally meet the Ghaggar but at a far more easterly shifted spot near Suratgarh. The final and the last shift completely disconnected the feeder channel from the Ghaggar system. It is believed to have now joined the Ganga system at its northerly hilly slopes. This resulted into the complete drying up of the Ghaggar and deprived the Sutlej and hence the Indus of a large amount of its water contribution. Misra argues brilliantly to show how this might have caused gradual sating of the Indus and thus could, in due course of time, bring about a crash in the economic surplus which had maintained the management of labour, craft and trade operations. That such an event was not sudden is almost certain. A gradual migration of the artisans and tradesmen towards Saurashtra and Haryana must have started as early as 1900 B.C. Even at the original Indus Valley towns we see the emergence of an altogether changed feature of the Jhukar and Jhangar culture. There is quite a possibility that this phase represents the first shift of the Ghaggar feeder to Chautang. People with trade connections had always maintained human contact with the Indus Valley and also various principalities further west which in turn may had contact with the Sumerians first and then the Babylonians. The Indo-European speakers finally entered the Indus plain during these 200 years of slow degeneration of the Indus economy. They might have come in several waves and brought their culture but their being the cause of destroying Indus culture does not seem attested by either the archaeological evidences or by

the numerous revised radio-carbon dates for the various stages of the culture now available.

'Copper hoard' Culture :

No discussion of Chalcolithic India, specially in the north, can be complete without considering a large number of finds from the Gangetic valley which have come to be nick named as the copper-hoard (as these were mainly found in caches). These have been found from surface without any other cultural items and are distributed from N W Pakistan in the west to Bengal in the east and Tamilnadu in the south. No possibility of any dating for these has so far been found. A thick water-logged pottery termed O C P or Ochre Colour Pottery is suspected to be associated with these copper objects on circumstantial ground. Further, since the same O C P type is claimed from more than one site as occurring before Iron, Copper hoard culture is taken to represent a late Harappan and pre-Iron culture. But this is still very tentative and not substantiated by any direct evidence.

The copper objects of this culture are both beaten and prepared by double casting. Objects usually found repeated are:

- (i) Antennae swords
- (ii) Harpoons
- (iii) Single and double axes
- (iv) Celts
- (v) Swords and
- (vi) Anthropomorphs

In western UP Bisauli, Rajpur Parsu, Mathura, Etawa and Saharapur are some of the areas where Copper hoards have been recorded from more than one spot. These are usually grouped within a single cultural area and referred to as copper hoards of Doab region. As opposed to these Khunti, Hami Saguna Mahasadal and Sonpur from W. Bengal and Bihar form the eastern group of Copper hoards. Likewise the central Indian region specially near Jabalpur-Nagpur strip yields another outlier of these copper objects. Gungeria in Balaghat district of Madhya Pradesh is one of

the richest of such sites. In the southern section the Copper hoards are generally distributed in the areas of concentration of the Neo-Chalcolithic sites like Brahmanpuri, Tekkalkota, Pikkhal, Ilalur, etc. Typologically these Copper hoards do show some geographical variations but there are more with regards to relative frequencies of the types than otherwise. Except for the enigmatic anthropomorphic motif the types are recorded with some marginal variation from either Harappan or west Asian Chalcolithic centres. This can conveniently lead us to assume some Harappan antecedent for the Copper hoard rather than taking them as the weapons of the destroyer of the Harappans and thus alluding to the all pervading 'Aryan bogie' for our explanation. At this state of our present knowledge it could also be a strong possibility that the Copper hoard cultures were completely contemporaneous with the late Harappan centers. A radio-carbon date from an excavated site belonging to this culture alone can solve our problem. Finally, one must admit that in our consideration of Chalcolithic India the Gangetic valley represent perhaps the only region which is still not fully understood. From the middle Ganga region (North Bihar) to lateritic W Bengal we enter into what can be best designated as Black-and-Red ware zone with a very late Neo-Chalcolithic feature.

We have talked about O.C.P. with copper hoard culture from the Ganga-Jamuna region earlier. Rajasthan shows another area of a rich chalcolithic development which by no means is post-Harappan yet it shows its own distinctive character. Let us look at some of these finds.

Jodhpura. The mound of Jodhpura lies on the right bank of the river Salai about 100 km. from Jaipur. The excavation was conducted by R.C. Agrawala. The lowest layer has been identified as O.C.P. in character. Basically red slipped ware with profusion of incised lines on the exterior characterise them. The types include handled pots, basins, vases and bowls. Both incised and painted designs are recorded, in some even applique boss is used. Harappan type round shaped terra cotta cakes along with terra cotta and stone beads are recorded. Some mud brick structures are also

recorded from this earliest phase. The author states that, "The carbon 14 dates given by PRL Ahmedabad for the later phase of O.C.P. at Jodhpura range between 2500 B.C. - 2200 B.C. suggesting thereby that this ceramic industry had its beginning in the region about 2800 B.C. - 3000 B.C." (Agarwal, R.C. 1981).

Ganeshwar. The site is located in Sikar district of Rajasthan. The site yields a red ware industry similar to the O.C.P. found in Jodhpura. The pottery is treated with a drab slip which has mostly peeled off. The occurrence of large number of copper tools found from this site makes it a significant occurrence. These include 400 arrow heads, 50 fish hooks, 58 flat copper axes, and dozens of other smaller pieces. The use of microlith is another significant feature of these occurrences. The association of O.C.P. with such rich copper tools with available absolute date puts these Rajasthan O.C.P. in a very peculiar position.

We might attempt to recapitulate the O.C.P. context in order to examine the possibility of declaring it as a distinct cultural phase in Chalcolithic India. The excavation at Saipai in district Etawah of U.P. for the first time yielded hooked swords and harpoons of copper in association with this ware. At Hastinapur the O.C.P. occurs below the iron bearing P.G.W. level. In the Doab region a number of sites have yielded O.C.P. with late Harappan elements. Sites with this context O.C.P. of are Alamgirpur, Ambakheri and Bargaon. Such Iron Age sites as Atranjikhera in Etah district, Lal Quila in Bulandshahr district and Ahichchitra in Bareilly district have all yielded an O.C.P. layer in their lowest deposit. There is a Thermoluminescent (TL) date available for one of the O.C.P. layers in this region and it is reported as 11th century B.C. (Gaur, 1983). Yet the TL date for O.C.P. estimated at Lal Quila, Naurpur and Jhuyina are 1880 B.C., 1340 B.C. and 2070 B.C. respectively. There is no doubt, therefore, that O.C.P. is one of the longest staying ceramic tradition in Chalcolithic India. May be it has an origin in Jodhpura region but it got spread to diverse regions. Particularly enigmatic is the fact that it occurs as a precursor to both the P.G.W. as also the Black-and-Red ware zone.

Extra Harappan Chalcolithic

We have a couple of excavated sites of Chalcolithic evidence from the eastern zone. These are Chirand from Bihar and Mahisadal and Pandu Rajar Dhibi from W Bengal. Broadly speaking all these show a duration of only six to seven centuries before iron appears. They start around 1500 B.C. and continue upto 1800 B.C. There are no such evidences of elaborate habitation structures as are known from as many of the western Chalcolithic sites. The pottery, however, shows an advanced technology of preparation and finish but in shapes finished varieties are not many. At Chirand, for instance, one encounters a large number of lustrous wares with burnishing on the exterior in addition to the grey, black, red and black and red wares. Spouted vessels, bowls, footed vessels and channel spouted bowls are the usual table wares known. Designs of decoration are mainly cross-cross lines and concentric circles painted in both black and red ochre. Initially there might have been pit dwellings but the Chalcolithic level shows circular huts of 4 meter diameter with paved floors. Wheat, rice, and lentils are found amongst the cereals cultivated. Very soon they give rise to another period with narrow necked goblets associated with iron. What would appear as extremely significant is that from pre-metal to iron the general cultural features hardly show any change in spite of the arrival of metals of greater efficiency. Pandu Rajar Dhibi in Bardhaman district is situated along the Ajay river. There are four periods identified of which the first two are counted as Chalcolithic and the rest are associated with iron. The huts are both round and rectangular and may have had red plastered walls. The floor is paved with lateritic mud and cow dung and the only radio-carbon date for this is as young as 1100 B.C. The pottery is both painted red ware as also black-and-ware. Storage jars dishes-on-stand, channel spouted vessels and high necked jars are some of the common ceramic forms. Decoration is limited to only geometric forms. Crude stone blades, ground stones axes and a number of copper objects including fish hooks beads bangles are the other objects known from the pre-iron levels of the site.

At Mahisadal in the district Birbhum adjoining to Burdhan the Chalcolithic levels are dated to almost 1350 B.C. but otherwise the cultural features are more or less comparable to Pandu Rajar Dhibi.

It would appear from the above that copper enters essentially within a stone-bone base in this region. Although in ceramic features they show considerable perfection these did not affect the total cultural status of these inhabitants. In fact the same features continue to occur even after iron emerges on the scene.

If we accept the northern Chalcolithic evidences as being contemporary with Harappans as the dates will suggest we might as well discard using the term O.C.P. for them. We have used O.C.P. in western U.P. to refer to a post-Harappan development. Thus, Ganeshwar-Jodhpura definitely are indigenous communities and their ceramic traits show a pre-Banasian stage only and we shall later name this as Jodhpura ware.

Noh. The site is situated near Bharatpur in Rajasthan. Agarwala reported a separate phase of un painted black-and-red ware preceding the Painted Gray Ware at this site. Association of iron is evidenced with both these ceramic stages. Here also the lowest level is designated as O.C.P.

We might examine some of the evidences of the middle Ganga Chalcolithic which has come to light in the recent years. Of these Narhan is one of the significant sites.

Narhan is situated on the left bank of the Ghaghara river in district Gorakhpur of eastern Uttar Pradesh. Five different cultural phases have been identified by the excavator (Purushottam Singh 1989) Period I is called Black-and-Red ware period, Period-II yields a black slipped ware, Period III yields Red ware with a thick gray ware and N.B.P. ; Period IV is designated to Sunga-Kushan period and finally Period V to Gupta period.

Period I shows post holes with evidences of possibly wattle and daub structures. Two successive floors of this period has been exposed. Each one of them show oven and hearths. Bone points, a polished stone axe, some pottery discs and animal bones of cattle, sheep and goat are the

other antiquities known. The principal ceramic type is black-and-red ware with painting in white, black slipped ware with occasional painting in white, red slipped ware, plain red ware and a limited number of sherds of burnished black and-red ware. The culture was datable to 1300 B.C.-800 B.C. copper objects start occurring from the end of this period. Singh considers this as an independent culture of the region and named it "Narhan culture". Subsequently the author tries to observe the extension of this and in the process discovers few more sites with almost identical features. These are, Imli-dih khurd, Sohagaure and Bhagrat.

Taradih. The mound of Taradih lies just to the south west of the Mahabodhi temple of Bodh Gaya. Small scale excavation by the Govt. of Bihar yielded numerous antiquities from this site. The Chalcolithic phase is represented in Period I. The ceramics comprise of hand made pottery, black-and-red ware and red ware of different shapes and sizes. These are also painted in some instances. The other finds include celt, quern, pebbles, stone balls, beads of semi precious stones, pendants and a single copper fish hook. Bone arrow heads, copper pins, copper chisel and terra cotta beads are the other objects and are found in small number. This decidedly indicate the first village settlement in the region during a late Chalcolithic phase.

Further east black and red ware sites are found spread over Orissa and Bengal. The cultural details and also the radio carbon dates of all these sites are uniformly similar. Besides Pandu Rajar Dhipi the other important sites are Tulapur, Kumardanga, Dihar, Saragdih, Tamluk, Bharatpur, Bahiri, Hatigra, Arrah, Bara Belun, Erur, Mangalkot and Oargram. Among these the excavated sites are Mangalkot, Arrah, Bharatpur, Bahiri, Dihar and Tulapur. Most of these sites yield a minor quantity of iron associated with black and red ware. Surprisingly copper objects are far more rare. A large number of radio carbon dates are available now for these sites. These range from 1440 B.C. to 910 B.C.

Ahar

South-east Rajasthan is an area which could be visualised as a region which joins Saurashtra in the south and the

Malwa region in the south-east with the southern fringes of the Thar in the west. In many regards it develops its own climatic individuality because of the rivers Gambhiri in the north and Berach in the south. These year round active rivers and their tributaries form almost the life line of the region. We have evidences of huge Palaeolithic populations in the region but surprisingly in the subsequent period the Thar region was no less attractive to the early settlers. The first human colonization of the region after the Mesolithic Chalcolithic period. Several sites of this period have been recorded along this and the Berach basin. Ahar, Gilund and Kayhatha, among these are excavated. Of these the first two are from Rajasthan while the third one lies towards the east in Malwa region. Finally it will be of interest to remember that Ahar is the closest to the Harappans both in geographical proximity as also in radio-carbon dates, if we do not consider the Haryana and East Punjab sites.

The excavation at Ahar has yielded a thirteen meter deep habitation debris spread over almost 500 meters by 270 meters. This will surely be indicative of a large enough population settled for a long enough period in this region. There are also direct evidences of an enormous amount of slag besides crucibles and furnaces found within the area. Further, unlike most of the Chalcolithic sites in the Gangetic valley Ahar does not have any deposit with iron content. There is no doubt, therefore, that here we are dealing with an active copper smelting activity and a colony developed in connection with this activity. Perhaps that can explain why Gilund lying only 80 km away shows some significant points of difference with Ahar.

At Ahar the houses are oblong and the walls are made of stone and mud-brick. These have, at times, been decorated with quartz. The roof must have been thatched and flat with wooden rafters used. Normally the houses carry no compartment, nor any courtyard and measure 7X5 meters or 3 X 3 meters. In an extreme case a house measuring 10 X 5 meters has also been recorded. Although no grains have been found it is believed that both bajra (millet) and rice may have been cultivated by these people. The oldest period

at Ahar is believed to extend to 2600 B C and hence falls well within the Harappan range. The cultural material yields multiple hearths, quartzite saddle and querns but no ring stone, bolas or celts. Curiously chert blades which are otherwise quite common in the Chalcolithic sites in the adjoining region, are conspicuously absent at this site. For a habitation debris of 13 meter thickness, finished copper implements are also not very many in number. In all 5 axes, one knife blade, one sheet, a bangle and 2 rings of copper are all that has been found. The copper technology also appears to be much poorer than what has been observed in the adjoining regions. The richest collection for the site is the ceramics and the terra cotta objects.

The Ahar ceramics yield at least seven main wares of which 2 types that dominate are:

(i) Black-and-Red wares with white paint used for decoration and (ii) Cream slipped wares with black paint used for decoration. Some of these show surface roughening on the lower part, while others show appliqué boss designs covering the entire exterior. Decoration is mainly linear or dots or series of comas. One of the most consistent shapes is dish-on-stand. Vase with corrugated shoulder and long neck, lotas and varieties of bowls besides crudely finished storage jars form the other types. Terra cotta figures mainly yield several humped cattle, bangles, stoppers, spindles and lids.

The other two sites of the Banasian complex are perfectly comparable to Ahar except for the fact of yielding several chert blades but still no celts, bolas or ring stones. It would appear that the Banasian complex has developed completely within a village infrastructure without even indication of a proper farming activity. Most of the ceramics being table-ware appear least congruous within the rural houses. Cutting of fire wood for smelting copper required axes and Ahar shows only some crude axes. In fact Kayatha lying further east has a much larger number of bangles and rings than Ahar itself. Knowing the chronological status of Ahar, it becomes a strong possibility to consider the Banasian group as merely miners' camp under the suzerainty of the Harappans at Lothal. Gilund and Kayatha in this regard

would appear to be relatively individualized and influenced by the Malwa regional features.

The radio carbon dates from Ahar are as follows:

Period IA	2600 - 2150 B.C.
Period IB	2150 - 1950 B.C.
Period IC	1950 - 1500 B.C.

Malwa

Western districts of Madhya Pradesh are traditionally referred to as the Malwa region. That is, from district Gwalior in the north to Nimar in the south forms its western border while in the east Raisen to Chattarpur forms the eastern border. Of these districts those lying northerly are very arid and dry and are mainly drained by numerous tributaries of Chambal and Betwa. The southern districts are very fertile primarily because of the Deccan lava forming its mantle. This lava produces extremely rich black soil which must have attracted agriculturists from the time of prehistory to history. A large amount of human colonization occurred along all these rivers from around 2000 B.C. and continued until 1100 B.C. when iron arrived. These sites and their cultural features are so homogenous that in literature they started getting referred to as the Malwa culture. Further south along the upper reaches of Godavari almost identical ceramic content is recorded in slightly changed context and these are also referred to as Malwa ware.

In Madhya Pradesh some of the well excavated Malwa sites are Eran, Nagda and Navdatoli. In northern Maharashtra the Malwan sites are Chandoli, Nevasa, Inamgaon and Diamabad. Around 1300 B.C. the north Maharashtra sites developed some different traits before finally showing iron around 1000 B.C. This group is called Jorwe ware. Navdatoli in its earliest phase yields a rich stone blade industry with copper objects, domesticated wheat as also cattle, sheep, goat and pig. The pottery shows a good many hand made specimens with the Banasian forms of Black-and-Red painted ware.

A red-slipped ware with decoration executed in black paint forms the other important ceramic group. The latter form

develops into what is identified as Malwa ceramics when it standardized its shape and decoration in the next phase. Both circular and rectangular pots of wattle and daub are described from all the phases of Navdatoli. Phase-II is marked by the total disappearance of the Banasian Black and Red ware and also the introduction of rice in the region (1600 B.C. approx.) Goblets with sand pedestals become quite common. It is in the next two phases that a complete individualization takes place. Lota shaped jars, goblets on stand, channel spouted bowls and storage jars are given a very shining red slip and then extensively decorated with variety of motifs. These include naturalistic, geometric and zoomorphic forms. Stylized representation of as many as 12 animals excluding the characteristic human forms with curly flowing hair have been recorded. It will not be an exaggeration to rate the Malwa ceramics as much richer than the Harappans if one were to consider the richness of their decorations. Metal objects known include copper antennae sword, knife, flat axe and fish hooks. Stone objects include an overwhelming number of chalcedony blades (with few retouched types of lunates, trapezes and knives), celts, ring stones, saddle and quern and bolus. Several terra cotta figurines of bulls or only horns of bulls form another group of finds. In one of the Malwa sites (Eran in dist Sagar) on the river Bina a defence wall prepared by mud brick has been attributed to the Malwa phase. Some authors saw some internal stratification indicative in the Malwa society because of the existence of two distinct varieties of dwelling structures. The rectangular houses were 10 X 6 m in measurement while the round ones had only 2.75 m diameter. It will be more logical to imagine these round structures as non-dwelling storage places, as other cultural features do not show enough evidences of this kind of stratification.

Savalde Culture. In 1956 Sali discovered a mound at Savalde on the southern bank of river Tapi in West Khandesh district in Maharashtra. (Sali, 1965, 1987) A small scale excavation first by Sali and then by R V Joshi yielded two periods of occupation. Period I was designated as belonging to Savalde culture. It was estimated on the

basis of radio carbon dates to occur between 2200 B.C. to 2000 B.C. Period II is designated to early Historic period and yields N B P and Black-and-Red ware ceramics.

The Savalda ware is of medium to coarse fabric made on a slow wheel and coated with a thick slip which shows cracks in many cases. The slip is light brown, chocolate, red, orange, buff and pink in colour. The most important feature which distinguishes it from the other chalcolithic painted wares of the region is that of painted designs of arms or weapons such as antennae arrow, notched arrow head, unilaterally barbed tools resembling a saw, double barbed fish hook and spear etc. The other motifs chosen for decoration shows peacock, fishplant motifs and geometrical designs. The types included are high necked jars with squat bodies, blunt carinated vessels, dish, platter, dish on-stand, basins, bowls, ring stand and knobbed lid. More than 50 more sites yielding similar kind of ceramics were described by Sali. In a nearby village Kandhra an ash mound was found associated with almost a meter thick Savalda occurrence. Sali opined that Savalda is an autochthonous chalcolithic culture of this zone and preceded the arrival of the Late Harappans. Allchin (1982) considered Savalda as only a stylistic variant of the Jorwe. Interestingly Sundara (1971) mentions Savalda ware from Bijapur and Belgaum districts of Karnataka as well. Sali tried to finally indicate his point when he excavated Diamabad in Srirampur district of Maharashtra. Here Savalda culture could be demonstrated as occurring before Late Harappan. The succession at Diamond was as follows:

Period I	Savalda culture	2200 - 2000 B.C.
Period II	Late Harappan	2000 - 1800 B.C.
Period III	Buff and Cream Ware	1800 - 1600 B.C.
Period IV	Malwa Culture	1600 - 1400 B.C.
Period V	Jorwe Culture	1400 - 1000 B.C.

The analysis of charred grains revealed that people of Savalda culture cultivated barley, lentil, common pea, black gram, horse gram and hyacinth beans. If these evidences are to be accepted then the antiquity of

and continuing till 700 B.C. The site yielded a sequence of three cultures and these are Malwa, Early Jorwe and Late Malwa region who occupied the site were the people from Around 1400 B.C. a new culture termed as Early Jorwe occupied the same area. It is significant to note that elsewhere in Maharashtra Jorwe culture appears only around 1300 B.C.

A distinguishing feature of the pattern of Chalcolithic settlement at Inamgaon is the location of the quarters for craftsmen on the periphery of the habitation. The period wise distribution of the various craftsmen identified are as follows:

- | | | |
|------------|---|--|
| Period I | : | Potter, Ivory carver. |
| Period II | : | Potter, Copper smith |
| Period III | : | Gold smith, Lime maker, wine distiller, potter and copper smith. |

A unique structure was encountered close to the craftsmen's quarter located in the center of the principal mound. It is squarish in shape (10.5 X 9.15 meter). This was partitioned into two rooms by a reed screen which was probably removed at some stage to make room for the storage bins. The structure had low mud walls - may be not more than 30 cm. high over this was erected the mud-plastered bamboo screen. Adjoining to this occurs another large structure with as many as five rooms in it. One of these was the kitchen. The early inhabitants of Inamgaon lived in rectangular houses which had thin, dwarf mud walls over which frame-work of split bamboo was fixed. Probably clay and cowdung used to be plastered over this screen. There is some indication of the existence of pit-dwellings also known. The economy was mixed and was based on agriculture, hunting and fishing. A number of crops such as wheat, barley, rice pulses and lentils have been identified along with seeds of such wild fruits as Jujube. Ivory objects, gold ornaments, lumps of finely made lime have been found from the site. There is even some distinct evidence of distillation known from this site.

Jorwe :

It is a culture which earned its name mainly from its ceramic specificity. It is found spread all over Maharashtra and may have evolved slightly later than the Malwa in Madhya Pradesh (1300 B.C. - 1400 B.C.). Inamgaon in Maharashtra provides us with maximum amount of cultural indicators for this period. It is a culture which had adapted to dried inland regions and heavily depended on irrigation, the evidences of which have been found. Wheat, barley and rice may have been cultivated in the initial stages but later stages adapted mainly to millets. Initially rectangular huts were used but eventually in the later phases these were all round in structure. At this stage the Jorwe of Maharashtra start showing numerous similarities with the Deccan Chalcolithic features.

The famous Jorwe ware is red or orange surfaced either matt surfaced or burnished with geometric designs executed in black. Carinated vessels with spouts fixed at various angles form one of the characteristic types. Carinated bowls and lotas are the other forms. Beads of agate, carnelian, gold, copper and even ivory have been recorded. Copper objects include axes, fish hooks and bangles.

It is argued that increasing aridity forced many of the early Jorwe settlements to either migrate to the Malwa region or adapt by changing their food habits around 1300 B.C. Thus, many Malwa regions show their final phases heavily influenced by Jorwe ceramics. Some of them might have migrated to the Deccan region. Thus, we see a chain of connections in at least archaeological terms, demonstrated over the whole length of India during Chalcolithic period. This is, while Banas remained influenced from Harappa, it also got influenced from Malwa. Malwa in turn shows Jorwe connection and Jorwe show connection with the Deccan Neo-Chalcolithic settlements.

7. Southern Chalcolithic Group :

Crossing Narmada one enters into the rugged plains of south India. Barring the coastal strips the inland regions are extremely rocky and dry. The main two rivers that drain the region are Godavari and Krishna (as one moves from

north to south) with their numerous tributaries. These tributaries originate in the western Ghats which extend fairly deep across the breadth of the Peninsula (almost two third of the breadth along Pune-Hyderabad axis i.e. 18°N). Most of the prehistoric occupations during Neolithic to Chalcolithic occur in these mountainous area. The tributaries of Godavari show Chalcolithic colonization between 2000 B.C. - 1100 B.C. which we have just got introduced to. Let us for our convenience refer to them as the Malwa-Jorwe group. The tributaries of Krishna, however, maintained altogether a different tradition. If the available radio-carbon dates are to be relied, these were occupied from as early as 2400 B.C. and continued to survive without any significant change till iron arrived. Many authors, as such, like to consider them with the development of Neolithic cultural phase. More than one hundred such sites have been reported so far and these are spread over Karnataka, Andhra and Tamil Nadu. Some of the most important of these occurrences are:

- (i) Kodekal, Utnur, Nagarjunakonda and Palavoy in Andhra
- (ii) Tekkalkota, Musli, Terdal, T Narsipur, Sangankallu, Kupgal, Hallur, Brahmagiri and Hemmige in Karnataka, and
- (iii) Gaurimedu, Mangalam and Plyampalli in Tamil Nadu.

Barring slight regional differences most of these sites are uniformly identical in both their features as also their succession pattern. That is, these are essentially hill dwellers with peripheral cultivation, hunting and cattle keeping. In almost all cases burials occur under living floor and hence these dwelling places might have been frequently abandoned and newer sites occupied. This might also explain the striking similarity between a large number of these sites. For the purpose of summarizing one can divide the succession of culture in these sites as follows:

1. A pure autochthonous Neolithic with poor pottery.
2. Without any change in other details, pottery shows improvement and with occasional metal intrusion (visualized as Jorwe contact period).

3. Again no basic change in the total culture but copper and bronze objects become common. Black-and Red ware and horse bones start occurring (The latter two attributes are typical of the Megalithic period that follows). Terra cotta figurines, faience beads and other precious stones are also found in many instances from this period.

We have briefly dealt with the evidences of the first period. The other two periods can be broadly taken as co-eval with the Maharashtra Chalcolithic period. What is most surprising is that a transition to a level of the knowledge of metal had very little impact on either cultural efficiency or cultural change. In the absence of any other data one can explain the situation as caused by a lack of an adequate demographic strength to launch into a labour intensive agriculture. The seeds domesticated by them also show a different level of farming. Millet, horse gram, bajra and legumes besides date palm and acacia species seem to have been their main food. For a community of mainly hunters and cattle keepers a shift to intensive farming requires a much complex super-structure and kinship organization. Developing symbiotic relationship with already settled communities lying between northern Maharashtra to Malwa would instead be an easier course. Thus, metals obtained in exchange were put to at the most tree felling, bush clearing and fishing but seldom to hunting. In ceramics decoration is virtually gone except a line along the border or radiating triangles. The fabric is thick and gritty and in the younger phases wheel thrown. Shallow dishes, lipped, spouted or channel spouted vessels, handled and hollow footed bowls, jars, dish-on stand and perforated pots are the usual types known from all the phases. Beads of gold, copper terra cotta, agate and carnelian are also found in some sites. The stone implements include a large number of extremely slender and long microlithic blades which are in a number of cases retouched into types. Some axes, knives, wedges, bores and saddle and quern are quite common. Metal objects include axes (very flat) and fish hooks. The rock habitat provided the base of their dwelling with mud plastering on the floor. These are round houses of only 2-3

meter diameter, with few cases of post-hole evidences. At Sangankallu a hut of 5 m diameter has been found with as many as 13 post-holes. Hearths and storage jars are quite commonly found in these huts. Terra cota figurines of bulls, horns and male human forms are known from some sites, while in others the rocks and boulders around the huts have art executions with brusings. These represent cattle, long-horned humped bulls, and deers. There are some riding or hunting human figures as well as some wheeled carts. At Tekkalkota a flat Terra cotta lid carries almost similar pattern of art execution with pin like punches done when the clay was leather hard. This shows a scene of a bull, cobra and two antelopes. In addition an important terra cotta object identified as head-rest forms a significant find from some of these sites. Finally, it must be mentioned that some of the peripherally lying sites among them specially Utnur, Kupgal, Kodekal and Palavoy have yielded huge deposits of cow dung ash. At Utnur even the hoof imprint has been found within this once wet cow dung heap. All these evidences taken together leave very little doubt about a considerable livestock maintenance as part of these Neo-Chalcolithic groups. It is argued by some that these cow dung heaps were deliberately set aflame as a part of some festivity which marked the completion of a seasonal cycle of migration. That is, shortly after harvesting the population would move out with their animals to graze them. They would return to the site, burn the cow dung heaps and start settling for a short period of cultivation of their sturdy crops. At the present state of our knowledge this would merely appear as one of the possibilities only.



Iron Age



1. General Considerations

Iron age in India brings one to the threshold of ancient history. This is, therefore, a period for which some of the historical accounts of ancient history may be extended. It is no wonder that as consequence of this large number of Vedic, Upanishadic and Brahmanic literary evidences have-from time to time-being recalled to understand the cultural processs then existing in India. To some, mixing of archaeological evidences with such literary accounts have become a standard method of dealing Iron age in India. It needs no overemphasizing here

that such an approach is essentially not conservative. To avoid this kind of an unholy amalgamation of methodology we might as well concentrate on the archaeology of Iron age in India. While doing so one cannot help but note that origin of iron in our sub-continent still remains a matter of dispute among specialists. It is important also to remember that like in Africa India has primitive tribes (Agarias of MP) who prepare iron with indigenous techniques and trade their finished wares. It will not be entirely illogical to assume that these communities must have had their knowledge from a time which might be preceding a formal Iron age by several thousand years. Formal Iron age sets in when this metal is harnessed to clear forests for establishing permanent colonies.

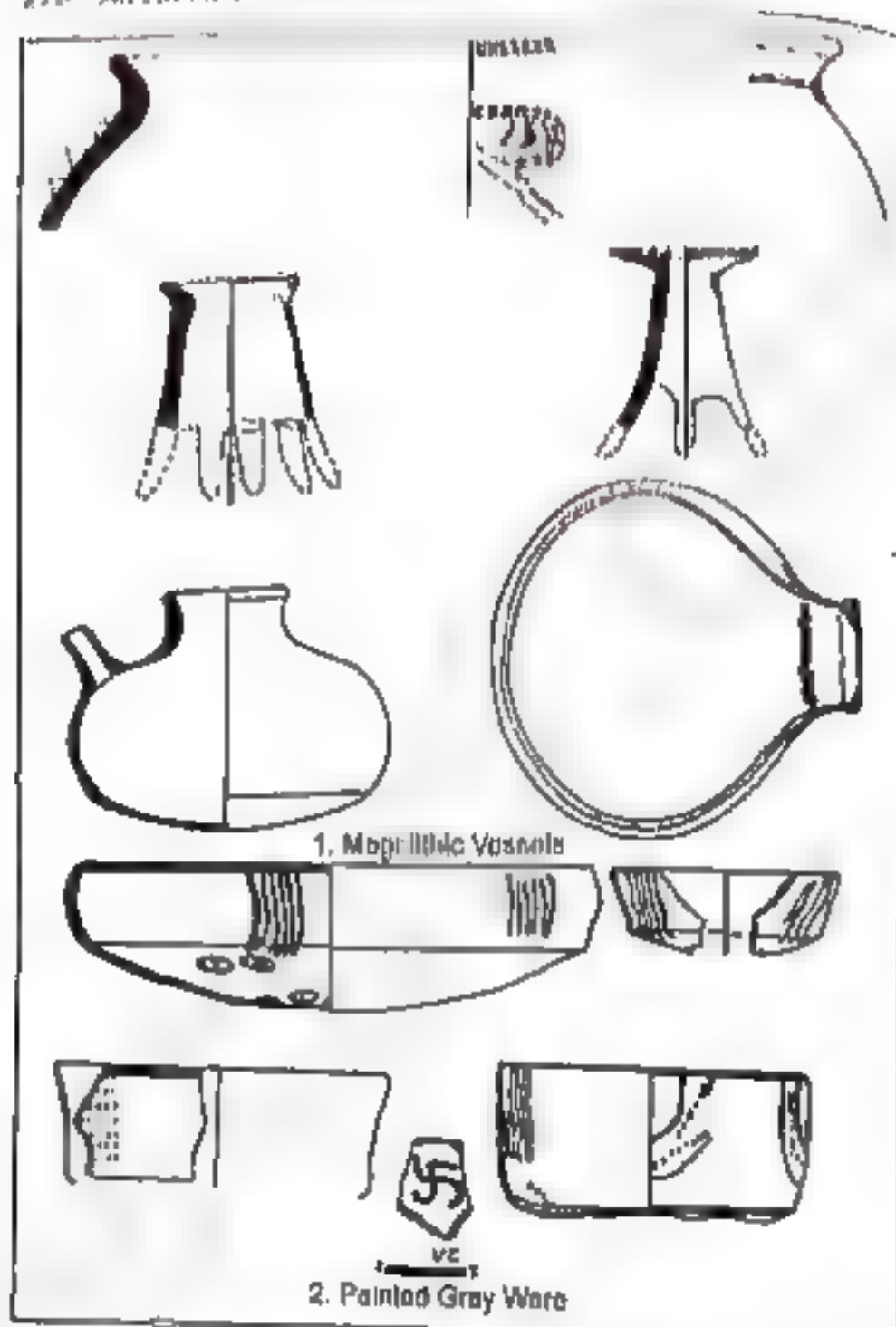
These might have eventually led to the establishment of large cities on the basis of a sizeable surplus and a super structure drawing upon this for its political power. Iron enters at different parts of India within different social contexts and hence the manifest resultant develops entirely different Iron age features in different areas. We might briefly examine these differentiating phenomena.

2. Gangetic Region

The colonization of Ganga basin by Iron users can be taken as one of the best evidences of second urbanization of India. Urban centers which mushroomed around Indus, Ghaggar and its tributaries during 2600 B.C. to 1500 B.C. were generally deserted after this. One would have normally expected a flush of population movement into the Ganga-Jamuna valley and indeed there is evidence of a rise in the number of the Siswal group of sites in Haryana and East Punjab. Significantly an urban development in the entire Gangetic basin does not emerge until late iron users settle their city states mostly in the western flanks (west of Allahabad) of the Ganga-Jamuna region. Thus, one has to admit that the Gangetic region was not at all an area of attraction for most of the metal users in prehistory. In comparison Saurashtra, northern Maharashtra or even Rajasthan seem to have been much more preferred.

Understanding of the colonization of this region needs a consideration of the changes that can be witnessed further

west. In Baluchistan the earliest development of settled economy and also perhaps the earliest evidence of copper (at Mehargarh. The occupation was abandoned before the development of mature Harappa but around the same region one can witness the transition of the post Harappan phase at Pirak. Initially Harappan influence can be demonstrated in this occupation center but very soon and perhaps around 1370-1340 B.C first pieces of iron appear. The cultural continuity from the pre-iron layers is so remarkable that an invasion by iron users as a possibility also cannot be entertained. The houses are again (like the pre-Harappan stage) prepared of mud bricks, the pottery is coarse with applique bands and finger tip impressions. Terra cotta figurines become much larger in frequency than the preceding period and they include horse, camel, humans-singly as also in the form of riders. The most important feature of this phase is the first time appearance of barley and rice cultivation in this zone. Terra cotta seals of the size of large coat buttons are also known but these do not show any comparison with the Harappans. Evidence of a full fledged adoption of iron, however, is not demonstrable until about another 2 to 3 centuries. That is, Iron age west of the Indus can be broadly ascribed to the time bracket of 1100-900 B.C. In the north-west another development, in all probability in an independent manner, is demonstrated from what is now generally known as the Gandhara sites. These are usually large complexes of graves and are entirely known and defined from the accompanying grave goods. Taxila, Charsada and Timargarha are some of the important sites from this complex. The pottery is a red burnished ware and shows some similarity with the later Mundigak ceramics. City structures in this region are not identifiable till about 500 B.C. Thus, like Pirak in south west, Gandharas receive this metal without any change in their pre existing culture. Furthermore these pre-existing cultures are completely individual in character and bear hardly any resemblance with the widely distributed Harappan features.



Iron age finally establishes beyond doubt that South and North India are basically distinct in their cultural history.

PGW

Around 800 B.C. an entirely new ceramic type associated with Iron spreads out all over Harayana, Rajasthan and

western U.P. along Yamuna and Ganga. Among these Noh, Jadhpora and Sardargarh in Rajasthan and Khalana, Batewara, Ahichchatra, Hastinapur, Allahpur, Atranjikhra, Jakhera and Mathura in U.P. are some of the well known and excavated sites. This new ceramic type has a thin fabric of very well levigated clay. It is fired uniformly grey by heating upto a temperature of 800° C in well oxygenated kilns. Thus, in terms of technique these ceramics can surely be counted as having reached the zenith. The shapes of the finished pots, however, show no variability. The main types are straight sided bowls, dishes and lots. Very few thick linear lines in bold black colour are used for decoration. Short spirals, sigmas, groups of strokes and swastikas are the usual paintings occurring in this ceramics group. This ceramic bears a resemblance to the Gandhara grave pottery only to the effect that both are grey in colour. This ceramic type has now come to be known as Painted Grey Ware or PGW. There are some stratigraphic evidences (Atranjikhra and Jakhera in U.P.) to show that probably a pre PGW did exist in western U.P. and this was a Black-and-Red ware. Whether then the PGW came to colonize the zone or they were also pre-iron can not be demonstrated. In fact so little is known about PGW that most of the commentaries on this culture are rather oversimplistic at the moment. Most significantly PGW sites are not entirely constituted by this specific ceramics. Both red ware and grey ware and some black slipped ware besides in the eastern sites a fairly moderate number of Black-and-Red ware are also known from these areas. Most of the PGW sites show wattle and daub huts. At Bhagwanpura these are circular for the early phase and become rectangular in subsequent phases but at Jakhera circular huts continue without any change. Yet in the latter site a bund, a moat and a road of about 4 meter width have been observed. These evidences hardly show anything comparable to the city development during Harappan culture. In fact PGW show a village character with a large scale colonization (more than 300 rich sites of this period are recorded so far) and multiple specialized craft activities.

Rice, wheat and barley are the cultivated cereals with sheep, cattle and buffalo forming the main animal types domesticated.

Bone objects and beads of PGW sites show a fairly high frequency. In rare instances glass as also lapis lazuli beads are also known. Bones or ivory has been used to form a variety of arrow heads, bangles, needles, combs and hair pins. Some animal forms like bull, birds and ram are represented in terra cotta but human forms are totally absent. Remarkable evidence of iron smelting and forging has come to light from Jodhpura. Iron implements also are varied and include such types as spear heads, arrow heads, socketed tangs, blades, sickles, axes, knives and tanga.

As one moves eastward in middle Ganga valley from Kausambi (Allahabad) onwards, iron gets merely grafted within the previously existing Chalcolithic Black-and-Red ware. Chronologically the point of emergence of iron in these sites is not very different from the western region. Generally speaking iron at Kausambi, Chirand, Mahasadal and Pandu Rajar Dhubi occurs around 800 B.C. But almost all these sites show the microlithic component continuing without much change. Sharply carinated vessels become quite common although most of them do not carry any decoration.

3. The Southern zone

Consideration of the southern zone would require paying some attention to south Rajasthan, Malwa and northern Maharashtra as a prior consideration. This is the area which developed a fairly consolidated regional character during 1500-1300 B.C. The Banasian leading to Kayatha and the latter to Malwa and finally to Maharashtra Jorwe almost demonstrated the movement from wheat to millet adaptation. Of these sites very few show an attraction to iron except a few items obtained probably by trade. Thus iron age in this area does not develop any special personality of its own like what has been observed in Western U.P.

The southern Neo-Chalcolithic sites which had shown so reluctant changes during their early metal period bring

about a change for the first time around 800 B.C. At Hallur this transition may have occurred a couple of centuries earlier while in some other regions a few centuries later. Considering a mid value, therefore, appearance of iron in South India can be taken as almost co-eval with the same in western U.P., i.e. 800-500 B.C. The iron age in South India till today is known entirely from a large and complex variety of burials and their accompanying grave goods like the Gandhara Grave culture. Since these graves have elaborate stone arrangements around them these have traditionally been nicknamed as **Megalithic culture**. A point of great inconsistency in adopting this term needs to be specially kept in mind. This is, while 'Megalithic culture of South India' means iron age the same term is the established designation used for a particular variety of so-called Neolithic culture in Europe. Further, the "Megaliths of India" may not refer to any prehistoric culture but the memorial stones erected by the tribals in Chhotanagpur and Patkai ranges in the historic period as well. Thus iron age in South India would appear to be a safer terminology to adopt.

The burials found so far with iron from the Deccan can be grouped as follows:

1. Large urns are used with collected bones of previously incinerated dead bodies in them. These urns are kept with grave goods in a pit. The pit after covering can be marked by a circular demarcation made of stone.
2. Cists are made out of slabs of stones and may at times be covered with a similar flat stone to cover. There are sometimes post holes also curved out of the slab used as chamber walls.
3. Legged urn or sarcophagi used to encase the body before burial is another important pattern of these Megaliths.
4. Sometimes chambers have been cut out in the compact lateritic floor and then the body has been placed in it.

There are a large number of variations seen in the pattern in which each of these disposal systems are operationalised.

In fact it would not be very wrong to state that within a couple of hundred miles the patterns change. The Megalithic arrangement on the ground to mark the grave also can vary from one kind of burial system to the other.

However, in spite of these external variations of grave pattern one can see a surprising similarity in other aspects. Black-and-Red ware, for instance, becomes one of the common denominators found almost without exception in all Iron age sites of Deccan India. The pottery types include carinated vessels, bowls with pedestals and spouted dishes besides a conical shaped lid often provided with a loop on the top. The iron implements which are common to all the Megalithic sites are flat axes with crossed straps, sickles, tripods, tridents, spear heads, multiple lamp hangers, arrow heads and lamps. Horse harness bits and various ornaments used on the frontal region of the head of a horse including bells are also known from a number of Megalithic burials.

The cultural repertoire of the Megalithic builders appears entirely exotic to the pre-existing cultural canvas of the region. And this led many specialists to visualize a new population movement from west. The traditional homeland of Chalcolithic culture, i.e. West Asia, does not show the practice of Megalithic burials and hence can no longer be taken as the source of dispersal of the iron using Megalithic builder. Instead the coastal regions of south Arabia and the Levant show sarcophagi and cist graves during Iron age. The land route to South India from Arab would have to include exactly those regions of Punjab and Haryana where iron occurs with an entirely different cultural association. This will, consequently, leave no option for us but to accept a population from Arabia having entered Deccan India through the sea route. Apparently these people did not create any urban settlements the likes of which we have witnessed in the Harappan period or during the phase of second urbanization in the Ganga valley. Megalithic builders might have maintained isolated gypsy like tented colonies where they might have bred and grazed horses to be traded with the newly rising political centers around the

middle Ganga valley. We have very little archaeological evidence to demonstrate who these Megalith builders were or for that matter why their knowledge of higher technology did not cause the rise of such urban trading centers which can bring about the growth of a complex civilization. Megalithic Iron age in Deccan India remained so much self-centered that it did not take much effort for the northern centers of power to spread their dominance into this region within a span of 500 to 600 years.

New Evidences of Iron:

The discovery of a site called Malhar in Chandauli district south of Banaras has changed the entire picture of iron having entered India from the west. Textual references of Rigveda was usually cited to indicate that iron smelting technology arrived from the west between 1000 B.C. to 600 B.C. The excavation carried out at Malhar revealed a sequence of four periods. These are

Period I	Pre Iron
Period II	Early Iron
Period III	N B P W
Period IV	B.C. 2000 to 300 A.D.

There is no stratigraphic interval between the layers of Period I and Period II. Iron is found in all the layers of Period II and identified finds include a nail, clamp, spear head, arrow head, awl, Knife, bangle, sickle and plough share. Iron slag as well as elongated clay crucibles are found in large number. Black-and-Red ware and black slipped wares along with bone tools and terra cotta beads form the other antiquities recovered from Period II. Two radiocarbon dates are available from this layer and these are 1882 B.C. and 2012 B.C. The quantity and types of iron artefacts and the level of technical advancement indicate that the introduction of iron working took place even earlier. This can possibly explain that iron smelting is practised even by some tribals in the adjoining region even today. That is, iron technology developed around the rocky haematite rich terrains of the north-eastern Vindhya. This indigenous technology may have been adopted for mass production only after about another 100 to 1000 years later when the second urbanization is recorded

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further north in the rich alluvial plains. In other words it is the development of a complex management and social order which actually determines the emergence of a full blown Iron age.